Decreasing Antibiotic Prescribing for Acute Bronchitis in Urgent Care: A Quality Improvement

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Table of Contents

Abstract

Background: Acute bronchitis is estimated to rank as the 5th leading reasons for outpatient visits (Terry, 2017). A cough is the main distinctive feature of acute bronchitis caused by a biological response defense mechanism of the body to damage tissue swelling on the trachea and large airways without having pneumonia symptoms. There is a common public misconception that acute bronchitis must be treated with an antibiotic. This public perception creates a considerable patient expectation that providers will concurrently prescribe these harmful medications. There is an increasing growth in antimicrobial resistance that has been a worldwide problem. Implementation of evidence-based strategies in this project will reflect a change and improvement in clinical practice as well as patient care outcomes. It will also contribute to establishing an empirically based knowledge.

Objective: The purpose of this project is to implement an evidence-based protocol guideline, *Acute Bronchitis Treatment Guideline* (ABTG) for providers to follow to decrease unnecessary antibiotic prescription practices to reduce unnecessary antibiotic prescriptions and guide appropriate treatment regimens for acute bronchitis.

Methods: The protocol was implemented in a Southern California Urgent Care. A pre-test and a posttest intervention questionnaire were performed.

Results: The data collected revealed a decrease of 11.6% in antibiotic prescriptions for acute bronchitis post intervention. The scoring percentage of the pre-intervention questionnaire was a mean of 89.74%. The scoring percentage of the post-intervention questionnaire was a mean of 100%. The increase in the knowledge questionnaire score was 10.26%. A significant improvement in knowledge questionnaire was noted with paired $t(5) = -2.697$, $p = .043$.

Keywords: acute bronchitis, guidelines, protocols, urgent care, antibiotic prescriptions

Decreasing Antibiotic Prescribing for Acute Bronchitis in Urgent Care: A Quality Improvement

There are several reasons why patients seek treatment from the urgent care and outpatient clinics one of them is a cough. A cough is the main distinctive feature of acute bronchitis caused by a biological response defense mechanism of the body to damage tissue swelling on the trachea and large airways without having pneumonia symptoms. Acute bronchitis is estimated to rank as the 5th leading reasons for outpatient visits and a reason for work-related absence due to illness (Terry, 2017). It is a self-limiting upper respiratory infection that takes about two to three weeks to resolve, however, a cough can last to a maximum of 6 weeks (Harris, Hicks, & Qaseem, 2016). The usual cause of bronchitis is viruses, and an antibiotic prescription is not indicated for patients who do not have chronic lung disease. The most common viral infections causing bronchitis are the respiratory syncytial virus (RSV), adenovirus, and parainfluenza (Centers for Disease Control and Prevention, 2017).

Patients that visit urgent care clinics often seek prescriptions from the providers after the failure of over the counter medications to alleviate their symptoms. However, there is a common public misconception that acute bronchitis must be treated with an antibiotic. This public perception creates a considerable patient expectation that providers will concurrently prescribe these harmful medications. There is an increasing growth in antimicrobial resistance that has been a worldwide problem (Kinkade, & Long, 2016). More than half of the patients who had acute bronchitis that were seen in an outpatient setting had been treated with antibiotics (Terry, 2017). According to Terry (2017), the practice of writing unnecessary antibiotic prescriptions has continued to contribute to increased antimicrobial resistance and increased adverse drug events, therefore, rising health care costs. The implementation of evidence-based strategies in

this project will reflect a change and improvement in clinical practice as well as patient care outcomes. It will also contribute to establishing an empirically based knowledge.

Background

Antibiotic overuse in uncomplicated acute bronchitis leads to more risks than benefits. Among all antibiotic prescriptions, broad-spectrum antibiotics accounted for about 97.8%, macrolides were prescribed in 87.0%, amoxicillin-clavulanate at 5%, fluoroquinolones at 3.3% (Grigoryan, Zoorob, Shah, Wang, Arya, & Trautner, 2017). Amoxicillin contributed to 2.3% of all antibiotic prescriptions, the remaining percentage of 2.3% of antibiotics are comprised of trimethoprim-sulfamethoxazole, clindamycin, and cephalosporins. There are known harms of antibiotic prescribing which includes *Clostridium difficile* colitis antibiotic-associated diarrhea, tendon rupture among older adults prescribed with fluoroquinolones, macrolides and other class causing QT prolongation, allergic reactions and renal compromise, (Fiore, Fettic, Wright, Ferrara, 2017). Potential harms of antibiotic overuse include increased asthma, obesity, immune system impairment, and mental health effects (Fiore et al., 2017).

According to Harris, Hicks & Qaseem (2016), 50% of antibiotic prescriptions were unnecessarily prescribed in the outpatient setting which equates to an excess cost of 3 billion dollars in 2009. But there was a decrease in antibiotic prescription by 18% over the past decade (Harris et al., 2016). However, in the United States, prescriptions were written for URI with broad-spectrum antibiotics; macrolides and fluoroquinolones increased by 4-fold (Harris et al., 2016). This data calls for a public health priority in reducing antibiotic prescription in the outpatient setting.

Multiple programs were launched with an effort to decrease antibiotic prescription. These include the CDC's, "*Get Smart: Know When Antibiotics Work"* launched in 2003 that

focused on outpatient setting to decrease inappropriate antibiotic use. The United States government also released a program in 2014 called, the *"National Action Plan for Combating Antibiotic-Resistant Bacteria"* that aims to lower unnecessary outpatient antibiotic use (Fiore et al., 2017). The program goal was to decrease use by 20% in the inpatient and 50% in the outpatient setting by the year 2020. Also, the World Health Organization (WHO) implemented its Global Action Plan on Antimicrobial Resistance to tackle antimicrobial resistance by reducing antibiotic prescriptions (World Health Organization, 2015).

The unnecessary antibiotic prescription is due to a variety of factors such as consumers' expectation of receiving antibiotics for symptoms of acute bronchitis. The patient demands, lack of antibiotic prescribing accountability, some clinicians' misconceptions regarding acute bronchitis and dissatisfaction on the clinician's part in failing to meet expectations of the patients are factors that contribute to the prescribing practices of providers (Dempsey, Businger, Whaley, Gagne, & Linder, 2014). Nurse leaders can contribute in efforts to improve antibiotic use by adopting principles of responsible antibiotic prescribing to their practice, shaping policy and ensure that practice standards are met (Terry, 2017). Over the past year, patients who seek medical treatment from the project site often expects and demands an oral antibiotic prescription for their symptoms including common colds and other upper respiratory infections. The clinicians in urgent care project site prescribed oral antibiotics to achieve patient satisfaction and to maintain patient returns. No specific evidence guidelines or protocols are being followed in the project site.

This project will utilize strategies and implement an evidence-based guideline protocol to decrease unnecessary antibiotic prescription in the urgent care. Prescription strategies that will be implemented in the urgent care site for acute uncomplicated acute bronchitis will also include

an algorithm from clinical guidelines endorsed by the American Academy of Family Physicians (AAFP), American College of Physicians-American Society of Internal Medicine (ACP-ASIM), Centers for Disease Control and Prevention (CDC) and Infectious Diseases Society of America (IDSA) (Gonzales, Anderer, McCulloch, Maselli, Bloom, Graf, Stahl, Stahl, Molecavage, & Metlay, 2013). Based on recent research and studies over the past five years, the implementation and adaptation of evidence-based algorithms and guidelines showed a decreased in unnecessary antibiotic prescribing (Gonzales et al., 2013).

Problem Statement

The overuse of antibiotics for acute bronchitis is a constant proliferating problem. The culture of antibiotic prescriptions to patients, even though the majority of the cases do not require antibiotic treatment due to its viral etiology requires continuous efforts to achieve improvement (Gidengil, Mehrotra, Beach, Setodji, Hunter, & Linder, 2016). The culture of prescribing shaped by clinical, social and economic factors enable the continued undesirable practices despite the evolving efforts to cease this practice (Ackerman, Gonzales, Stahl, & Metlay, 2013). Growth in awareness among the front lines of this battle, the family practitioners/clinicians and providers is needed (Harris, Hicks, & Qaseem, 2016). According to Oesterle, Sternemann, Sande, Aplin, & Towers (2016), further described that antimicrobial resistance is becoming an epidemic, but patients continue to believe that antibiotics are necessary for recovery. Hence, rational prescribing practices are expected and known to reduce antimicrobial resistance (Oesterle, et al., 2016).

The approach for this project will include an educational intervention and implementation of guidelines to decrease antibiotic prescribing in an urgent care facility. Clinicians in the urgent care do not follow a specific evidence-based guideline or protocol in treating patients who visit

for acute bronchitis and other upper respiratory infections. The physicians, physician assistants and nurse practitioners in the project site manage patient symptoms based on their background knowledge, patient demand and expectation, and some providers think that patients would be dissatisfied if antibiotics were not prescribed (Dempsey et al., 2014). The clinicians and the patients in the urgent care host site will benefit from the DNP project to decrease the prescription of unnecessary antimicrobial treatment for acute bronchitis through educational sessions for the clinicians on CDC treatment guidelines and antibiotic prescribing strategies. Prescription strategies and algorithm were previously implemented in a primary care setting that demonstrated an effective method to reduce URI antibiotic prescriptions (Oesterle et al., 2016). The standardized protocol including the adoption of an algorithm and provider education will aid in efforts to decrease unnecessary antibiotic prescription for acute bronchitis in the project site. The implementation of evidence-based guidelines will increase knowledge among providers to promote appropriate understanding for patients by labeling acute bronchitis as “chest cold” or “viral upper respiratory infection” (Harris et al., 2016).

Purpose Statement

The purpose of this quality improvement project is to reduce antibiotic prescriptions for acute uncomplicated bronchitis in a Southern California outpatient urgent care facility. The focus of the project is to implement an evidence-based protocol guideline for providers to follow to decrease unnecessary antibiotic prescription practices. This quality improvement project aims to reduce unnecessary antibiotic prescriptions and guide appropriate treatment regimens for acute bronchitis by implementing an evidence-based *Acute Bronchitis Treatment Guideline* (ABTG) at the project site.

Project Question

Project Question: Will the implementation of an evidence-based ABTG protocol decrease antibiotic prescribing in the urgent care facility after the implementation? Population includes providers in the project site who treat adult patients from 18 to 65 years of age seeking medical treatment for acute bronchitis and other upper respiratory symptoms.

Objectives

In the timeframe of this DNP Project, the project site will:

1. Implement an evidence-based ABTG for providers to follow in treating patient's presenting with signs and symptoms of acute bronchitis and upper respiratory infections.
2. The DNP student will implement a robust provider/clinician specific training program for all staff that retains prescriptive rights.
3. The providers/clinicians at the host site will follow an evidence-based algorithm for guidance while making antibiotic prescription decisions.
4. A decrease antibiotic prescription rates related to the diagnosis code of Acute Bronchitis will be seen in a retrospective sample of approximately 40 patient medical records.

Significance

Several randomized clinical trials show that antibiotics are ineffective for acute uncomplicated bronchitis (Harris, Hicks & Qaseem, 2016). Treatment of acute bronchitis and other upper respiratory infections with unnecessary antibiotics contributes to antibiotic resistance (Terry, 2017). A cluster-randomized trial conducted among primary care providers in an outpatient setting using paper algorithms used as an intervention demonstrated an 11% decrease in antibiotic prescribing for acute bronchitis (Terry, 2017). Multiple clinical guideline recommendations from professional societies and federal agencies support clinicians in

providing evidence-based care for acute bronchitis and other upper respiratory infection (Harris, Hicks & Qaseem, 2016). The clinical guideline antibiotic prescribing strategy and algorithm called "*Evidence-Based Management of Acute Respiratory Infections*" from the American College of Physicians (ACP) and the CDC, as well as an algorithm from the AAFP, ACP-ASIM, CDC, and IDSA, is incorporated in this project (Gonzales et al., 2013). The clinical guideline support tool is based on an evidence approach to assess pneumonia in patients who sought treatment with cough illness with the purpose as a support strategy to help reduce overuse of antibiotics in primary care settings (Gonzales et al., 2013). The implementation of this decision support tool in an outpatient clinic provided a 20% reduced rate in antibiotic prescription by the clinicians (Gonzales et al., 2013).

Search Terms

The research was limited to studies within the last five years conducted in the United States (U.S.). Studies that are more than six years, and studies for complicated acute bronchitis as well as patients who have a history of chronic diseases such as chronic bronchitis and chronic obstructed pulmonary disease (COPD), or any identifiable cause such as pneumonia or sinusitis were excluded from the search criteria. Ten research studies that served as references to support this project use randomized cluster trials, quasi-experiment, statistical analysis and random samples completed by the researchers that can be utilized to decrease antibiotic prescriptions for acute viral bronchitis and upper respiratory illnesses. Several sources were explored using the Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Library, EBSCOhost, ProQuest and Pubmed to retrieve scholarly evidence supporting this DNP project. These databases were accessed through the Jay Sexter Online Library, Touro University Nevada. Keywords such as "antibiotic prescribing," "acute bronchitis," and "antibiotic resistance" were

used as search terms to obtain relevant articles and studies to the project. Database search term acute bronchitis and antibiotics returned with more than 2,500 search results. The studies were reviewed and narrowed with specific terms such as "acute bronchitis in outpatient" and "decreasing antibiotic prescriptions in acute bronchitis" to their relevance to antibiotic treatment for acute bronchitis in the outpatient settings and implementations of guidelines, and strategies. The search terms narrowed the number of articles found to 132 results.

Review of Literature

The literature review comprises of studies involving integrative studies on acute bronchitis and the prevalence of antibiotic prescribing, acute bronchitis diagnosis and treatment, clinical practice guidelines. This section presents selected literature critiqued for its impact on implementations of various strategies and interventions to decrease antibiotic prescribing using evidence-based protocols that are specific to acute bronchitis and URIs and barriers to guideline and protocol adherence. Inclusion criteria for the literatures are researches and studies performed within the last five years which were all conducted in the United States for acute bronchitis and upper respiratory infections. Inclusion criteria are healthy adults 18 to 65 years of age. Chronic diseases such as COPD, pneumonia, emphysema or chronic bronchitis were excluded in the literatures. Infant, children and adults from age 66 and above were also excluded from the studies.

A cluster randomized trial performed by Ackerman et al. (2013), with physicians, physician assistants (PA), and nurse practitioners (NP) from 33 practices utilizing print-based and electronic medical record (EMR) based treatment algorithms. The research indicated awareness of antibiotic resistance among the prescribers impacted their prescribing decisions. Lectures and brochures for appropriate antibiotic prescribing for URIs were explained to the

providers with the distribution of pamphlets to patients with a chief complaint of a cough upon check-in. Ninety three percent of the providers concur that prescribing unnecessary antibiotics causes resistance and 97% of the providers agreed that antibiotic resistance is a significant health concern (Ackerman et al., 2013). The survey also revealed that 72% of the clinicians believed that dissatisfaction among patients results from leaving the outpatient settings without an antibiotic prescription. The paper-based intervention, the Evidence-Based Management of Acute Respiratory Infections derived from clinical practice guideline endorsed by the AAFP, ACP-ASIM, CDC, and IDSA was used. The EMR-based intervention assisted in good medical decision making and the paper-based intervention served as a reference in discussing with patients the diagnosis and treatment plans (Ackerman et al., 2013).

Current Provider Practice and Assumptions

Dempsey et al., (2014) conducted qualitative semi-structured interviews using thematic content analysis with 13 primary care clinicians in Boston, Massachusetts to explore their understanding about acute bronchitis guidelines, barriers to adherence and their thoughts about interventions to decrease antibiotic prescribing. There were three interview guide domains which include “contemporary views on patient guidelines and antibiotic prescribing,” “barriers to guideline adherence” and the third domain is “methods to reduce antibiotic prescribing.” Results from the interview revealed that providers agreed with the guidelines that acute bronchitis does not require antibiotic treatment and felt that they were responsible for overprescribing (Dempsey et al., 2014). Barriers to guideline adherence were identified including patient demand, lack of antibiotic prescribing accountability, saving time and money, misconceptions about acute bronchitis and diagnostic uncertainty, and dissatisfaction among the clinician’s failure to meet

patient expectations (Dempsey et al., 2014). Providers also believed that pre-visit triage by nurses might prevent future visits and can change patients' expectations.

A random sample of clinicians surveyed and pilot testing with 31 clinicians in two settings a) outpatient offices in the University of Pittsburgh Medical Center and b) a national retail clinic chain with 19 states clinics was performed by Gidengil et al. (2016). The study identified factors causing variation in prescribing antibiotics by clinicians in two settings using electronic health data for outpatient visits for acute bronchitis and URIs. Results showed that antibiotics were prescribed lesser in physician offices than in retail clinics (Gidengil et al., 2016). The study concluded that poor antibiotic prescribing practices were associated with clinicians' feeling rushed, believing that there was no problem with patient demand.

Prescribing Guidelines

Fiore et al. (2017) reviewed literature including a retrospective analysis that antibiotic prescribing between 2006 and 2010 found that outpatient practices prescribed more antibiotics for URIs than emergency departments (ED). Reasons for overprescribing based on a 2015 systematic literature review includes pharmaceutical company marketing activities; patient demand contributed to antibiotic prescribing for acute bronchitis and fear of losing patients among the clinicians (Fiore et al., 2017). According to the article, the strategies demonstrated success over the past decade included tips to maintain patient satisfaction without prescribing antibiotics. The success was achieved by explaining to the patient the difference between viral and bacterial and to return if the condition worsens. Second, by providing a delayed prescription advising patient to fill only if symptoms don't improve in a few days, and using a symptom treatment prescription pad such as nasal rinses, nonsteroidal anti-inflammatory drugs/

acetaminophen or salt gargles so that patients will have something in hand when leaving the office (Fiore et al., 2017).

A cluster-randomized trial conducted by Gonzales et al. (2013), with 33 primary care providers on the use of antibiotics for uncomplicated acute bronchitis. Interventions used were paper and electronic algorithms, as well as patient education pamphlet, Get Smart program obtained from CDC for those who visit with a chief complaint of a cough. The study results demonstrated that there was a decrease in antibiotic prescribing by 11.7% after the paper pamphlet was given to patients (Gonzales et al., 2013).

A study conducted by Grigoryan et al. (2017) used the Epic Clarity database EMR system antibiotic prescribing patterns for uncomplicated bronchitis in a family medicine clinic from 2011 to 2016. There were 2244 (62.1%) antibiotic prescriptions given out of 3616 visits due to uncomplicated bronchitis (Grigoryan et al., 2017). The Geisinger Health System Institutional Review Board (IRB) approved the study (Grigoryan et al., 2017). The age groups frequently prescribed with antibiotics are ages from 18-39 years with 66.9%, followed by patients 65 years old and above (59.0%), and 58.7% on ages 40-64 years old (Grigoryan et al., 2017). The limitation of the study according to the researchers was that the populations were predominantly Caucasians who have private insurance and the findings might not represent the overall U.S. population (Grigoryan et al., 2017). The study resulted in a change in the prescribers' perception who acknowledged that they prescribed antibiotics more often that required (Grigoryan et al., 2017). The intervention of print based decision was useful when diagnosis and treatment were discussed with the patients seen in the outpatient clinics.

Harris, Hicks, Qaseem (2016) conducted a narrative literature review of evidence on antibiotic use in adults with acute respiratory tract infections (ARTIs) including acute

uncomplicated bronchitis. The article was approved by the CDC and ACP High-Value Care Task Force with the development of a clinical guideline table on antibiotic prescribing strategies for adult patients with acute respiratory tract infection. The researchers advised that clinicians should not start the patient on antibiotic therapy or order tests such as chest x-ray to patients with bronchitis unless they suspect pneumonia (Harris et al., 2016). The evidence-based strategies; "Antibiotic Prescribing Strategies for Adult Patients with Acute Respiratory Infection" and the "Advice on high-value care on appropriate antibiotic use for acute respiratory tract infection in adult" is recommended by the American College of Physicians (ACP) and the CDC to increase patient satisfaction and decrease antibiotic prescribing for ARTI (Harris et al., 2016). The Antibiotic Prescribing Strategies for Adult Patients summarizes variables; acute bronchitis, pharyngitis, acute rhinosinusitis and common cold with their possible causes, benefits/ no benefits of antibiotic use, the harms of using antibiotics, prescribing strategies, recommended regimen, and hypersensitivity (Harris et al., 2016). The Advice on high value care on appropriate antibiotic use covers four advises for healthcare providers such as when to test patients and when not to perform testing or initiate antibiotic therapy (Harris et al., 2016). The approach was offered to clinicians and showed in a recent study to decrease antibiotic prescribing for ARTI and increase patient satisfaction ratings (Harris et al., 2016).

Provider/Patient Education

A quasi-experimental design study performed by Holmes, Struwe, & Waltman (2018) determined that antibiotic stewardship effectiveness in the attitudes and intentions of providers toward antibiotic use decreased prescriptions for acute bronchitis. Intervention includes a PowerPoint presentation among physicians, physician assistants and nurse practitioners in a university health center. The study demonstrated fewer prescriptions of antibiotics by the

providers for acute bronchitis two months after the educational intervention. The employment of antibiotic stewardship program appeared to have an impact on provider practice (Holmes et al., 2018).

Oesterle et al. (2016) conducted a quasi-experimental chart review over three months after providing a brief educational session on CDC treatment guidelines for acute bronchitis, pharyngitis, and sinusitis with printed pamphlets provided to patients who presented with URIs. A summary of results indicated that an improvement in guidelines adherence was achieved for acute bronchitis, however, there was no significant improvement for sinusitis and pharyngitis (Oesterle et al., 2016).

Impact of the Problem

Acute bronchitis is one of the most common health reasons for 100 million (10%) outpatient visits every year and results to over 70% of adult antibiotic prescriptions (Harris, Hicks & Qaseem, 2016). The unnecessary antibiotic prescriptions for acute bronchitis lead to adverse drug events and drug-resistant infections (Ackerman et al., 2013). According to CDC, (2017), the excess prescriptions increases risk to adverse reactions including *Clostridium difficile*. The Agency for Healthcare Research and Quality (AHRQ) states that from 1990 to February 2015 at least two million individuals were affected by antibiotic-resistant bacteria with total deaths of 23,000 in the United States (AHRQ, 2016). In addition to their systematic review, a key factor that increases antibiotic resistance rate is due to consumption of outpatient antibiotics (AHRQ, 2016). Several interventions and evaluation methods were conducted aiming to decrease antibiotic use showing limited success (Ackerman et al., 2013). The increased risk in resistance to antibiotics and its use for acute bronchitis resulted to a quality performance measure by the National Committee for Quality Assurance (NCQA) in its Health Effectiveness Data and

Information Set (HEDIS) reported by U.S. health insurers (Ackerman et al., 2013). The HEDIS quality performance measure commits to avoidance of antibiotic treatment in adults with acute bronchitis (AAB) and to measure the percentage of adults age 18 to 64 years who were not treated with antibiotic with uncomplicated acute bronchitis diagnosis (HEDIS Measure, 2018).

Prescribing Tools and Provider/Patient Education

Terry (2017) conducted an integrative review of methods that may be adopted to decrease antibiotic prescriptions for acute bronchitis and URIs using ten research studies. The integrative review showed a reduced rate of inappropriate antibiotic prescription depending on the clinical decision support (CDS) tool used (Terry, 2017). The utilization of paper algorithms as intervention in an outpatient setting demonstrated a decreased in antibiotic prescribing by 11% in a cluster-randomized trial (Terry, 2017). CDS systems do not eliminate inappropriate antibiotic prescribing; however, they do promote a measurable reduction (Terry, 2017).

The project site is in an urgent care facility located in Southern California, United States. Antibiotic prescribing for acute bronchitis in adult patients in the ambulatory outpatient settings appears to be an increasing healthcare concern **(**Oesterle et al., 2016). A randomized cluster trial using decision support strategies was conducted to reduce antibiotic use in acute bronchitis (Gonzales et al., 2013). A printed algorithm decision support stool and computer-assisted decision support intervention, as well as patient education brochures where provided upon patient check-in, were used (Gonzales et al., 2013). The implementation of the decision support tool for acute bronchitis was shown to be effective and resulted in a decrease in antibiotic treatment for acute bronchitis (Gonzales et al., 2013). The study conducted by Ackerman et al. (2013) also utilized a printed algorithm included in the education session to the providers and

found that it served as a useful reminder or prompt in clinical reasoning among the clinicians about appropriate prescribing criteria for antibiotics.

An important strategy in reducing inappropriate antibiotic prescriptions in outpatient setting includes a consistent implementation of a clinical decision support tool (Terry, 2017). Utilization of patient education posters used in studies may change patient expectations and provide education to the patients and the public. Sensible prescribing practices must be supported to decrease antimicrobial resistance in the community (CDC, 2017). Barriers to adherence to clinical guidelines explain the inappropriate antibiotic prescribing (Harris et al., 2016). Promotion of appropriate antibiotic prescription practice includes continued education to clinicians and patients, clinician audit and feedback, providing delayed prescribing practices, financial incentives, and health information technologies (Harris et al., 2016).

Current Management

The project site, an urgent care facility treats patients with acute and chronic conditions. Acute conditions include patients who visit with a cough, acute bronchitis and other URIs with expectations for antibiotic prescriptions. Patients seen in the urgent care setting are various ages from children to adults. Patients who require rapid and advanced treatments such as chest pains or difficulty breathing are referred to the next level of care EDs for evaluations and management. Multiple guidelines are available to clinicians in the project site via the internet. There is no specific guideline followed for acute bronchitis in the project site. The clinicians' decision for prescribing antibiotic is often based on the patient's request for antibiotic; the patient's verbalization of their symptoms such as "fever and greenish phlegm". The prescribers in the urgent care facility often document their diagnosis as "acute bronchitis, likely bacterial etiology". No specific protocol or guidelines are being followed or established at the host site as the

clinicians used the internet and their background knowledge when treating patients with cough symptoms.

Current Recommendations

An integrative review of the literature by Terry (2017) examined that clinical decision strategies addressed the practice gap in the appropriate management of acute bronchitis and showed improvement in both patient and provider education. Educational interventions to clinicians in the outpatient settings resulted in a significant increase in clinician knowledge which, in turn, decreased antibiotic prescribing by those who received the educational intervention (Gonzales et al., 2013).

A recommendation to address the worldwide antibiotic resistance is employment of antibiotic stewardship programs for providers. Providing information to providers, education to patients, and the general public about growing problem, consequences of antibiotic use and the steps to eliminate antimicrobial resistance will assist in the efforts to address the problem (Holmes, Struwe, & Waltman, 2018). The antibiotic stewardship program demonstrates a positive impact on provider practice; hence, this program is suggested to be replicated in a larger sample size of providers and patients that could examine outcome for a longer time frame (Holmes et al., 2018).

Recommendations to address barriers in guideline adherence are as follows; 1) continuous education through patient-directed materials such as pamphlets, posters and providing over the counter prescription pads may address perceived patient demand for antibiotics. 2) Providing feedback to clinicians to feel secure in their decision for not prescribing antibiotics 3) Consideration of the method “running commentary” to influence expectations and to educate and reassure patients 4) Providers using terms such as “chest cold” to lessen patient

expectation for antibiotics 5) Focus must be on treating patient symptomatically with education on realistic duration and expectations in regards to cough (Dempsey et al., 2014).

Benefits of Current Recommendations

Despite the implementation of print and electronic decision support strategies and its significance in encouraging judicious antibiotic prescribing, barriers still exist to judicious antibiotic prescribing as cited by clinicians including patient expectations, diagnostic uncertainty and time pressure (Dempsey et al., 2014). Benefits of current recommendations stated in the theme above conclude that the combination of provider and patient education is known to be one of the most effective approaches in decreasing antibiotic treatment.

Controversies

There were no conflicts of interest such as financial contributions collected from companies or organizations, and no major controversies existed from the literature.

Theory Identification and the Historical Development of the Theory

Kurt Lewin developed the "Change Theory," a nursing model that applies to the integration of change within a health care system. Lewin speculated the “unfreezing-change-refreeze model” as the three-step model change which requires learning to be rejected and be replaced. This three-step model he theorized is essential to the Change Theory (Petiprin, 2016).

Kurt Lewin’s theory of change is used as a theoretical framework in this DNP project. Lewin’s approach in managing change through his fundamental model “changing as three steps” (CATS) as the unfreezing followed by changing, and final stage, refreezing is argued by scholars to over-simplify the process of change (Cummings, Bridgman, & Brown, 2016). To this day the CATS (see Appendices A and B) are considered to be the foundational approach for change management; its fundamental assumptions on the change process are derived from Kurt Lewin.

Lewin studied change management and he provided a solid basis for the development of change management. Over the past fifty years, Lewin's CATS had influenced western theories of change (Cummings et al., 2016). The development of the CATS theory was through interpretations of Lewin's ideas relating to change as both critics and supporters of the theory argued that CATS was not significant in Lewin's writings. The CATS theory is what critics looked over when Lewin wrote and cited in 1947 *Human Relations* article which was published weeks after his death and the change theory we know today is a subsequent reconstruction of Kurt Lewin's writings (Cummings et al., 2016). Before his death, Lewin briefly mentioned CATS as he considered the change process and noted that problems revolving change need more research (Cummings et al., 2016). According to Cummings et al., (2016), Lewin did not write any book about CATS rather had great thoughts about it. The theory was supported by an "edited compilation of his scattered papers" as Field Theory in Social Science and published subsequently after his death (Cummings et al., 2016). The earlier collection was compiled by Kurt Lewin's widow and the second volume called the Field Theory was edited by Dorwin Cartwright (Cummings et al., 2016). The formation of Lewin's CATS was unnoticed until the end of the 1980s. The formation of the change theory was attributed to Lewin's Ph.D. student, Ronald Lippitt, who came back to Lewin's idea and cited it as the three-phase model and brought recognition to the importance of the theory a decade after the theorist's death (Cummings et al., 2016). In 1961, Edgar Schein interpreted the idea towards CATS as an intervention approach and calls it as the "phases of influence" (Cummings et al., 2016). Schein transformed Lewin's "moving" for "changing" along with the transposition from freezing to refreezing made CATS as a method to observe change he also fills the phase as "unfreezing- changing- refreezing" model.

Nursing in healthcare is expected to deliver and provide care that is based on the best available practice or evidence. This only suggests that continuous improvement of knowledge and change in practice is essential. Often, a plan for change implementation can be challenging, and complexities occur during a plan for change in an organization. The CATS or Lewin's three-step model of change is emphasized and used as a framework in to change practice and improve patient care (Wojciechowski, Pearsall, Murphy, & French, 2016). Hence, Lewin's change theory attempts to implement change in nursing and healthcare.

Applicability of Theory to Current Practice

Today's healthcare system involves complex problems that need to be addressed requiring implementation of current evidence-based practices with professional collaboration among disciplines. Collaboration among professional disciplines often reflects conflict and different views regarding the application of strategies in planning, development of interventions, and sustaining change in the implementation of quality improvement projects (Wojciechowski et al., 2016). Lewin's Three-Step Model for Change Management is used as a framework for improving and sustaining updates in healthcare. An example is its application and utilization by nurses in many specialty areas in transforming care at the bedside through quality improvement projects (Wojciechowski et al., 2016). While healthcare organizations have complex adaptive systems, a complex process by facilitating interprofessional collaboration is one approach in solving the problem. Integration of the Lewin's Change Theory for a quality care improvement includes a method of collaboration and creation of an intervention.

The process of applying the theory in planning change is by executing the first step (unfreezing) to create an awareness of the problem and finding ways for staff to eventually let go of previous practices by educating, and demonstrating the existing issues. The second step,

changing/moving, involves role modeling updated approaches by training and coaching. The third step (refreezing) is to stabilize or maintain the new equilibrium by celebrating success, compliance monitoring, and re-training. The concepts of Lewin's change theory model create feasibility of utilizing best practice models in facilitating collaboration to solve complex problems that exist in healthcare (Wojciechowski et al., 2016).

Major Tenets of the Theory

The foundational tenets of the Change Theory as identified by Moran, Burson, & Conrad (2017) include cultivating an attitude of openness to uncertainty and difference, understanding health as a process, and participating in scientific inquiry. Lewin's three-step model, unfreezing-change and refreezing has been used to bring changes to clinical practice as well as in nursing research (Batras, Duff, & Smith, 2016).

Cultivating an attitude of openness to uncertainty and difference

The foundational tenet, *cultivating an attitude of openness to uncertainty and difference,* can relate to the unfreezing stage of the change theory. Unfreezing is the step where the process of destabilization of the previous behavior of an individual must be disregarded or unlearned for a new practice to be successfully adapted (Petiprin, 2016). The person being introduced to change must be open to the uncertainty and the difference between the previous and the new behavior to be able to adapt to the change.

Understanding health as a process

Change or moving is the second step of Lewin's theory which determines that unfreezing is not an end in itself. The unfreezing includes creating awareness among members and making it possible to be understood in a way that makes people let go of old ways of practice. The theory has been applied to bringing change in an organization with the purpose of health

promotion (Batras, Duff, & Smith, 2016). Facilitating change in the healthcare industry depicts understanding of goals, forces, and solutions in advancing the healthcare system.

Scientific Inquiry

The third foundational tenet is participating in the scientific inquiry. Lewin's theory also relates to participation in scientific inquiry. The three-step change theory serves as a method of research to analyze the forces that resist the change (Batras, Duff, & Smith, 2016). The implementation process involves learning and research to promote change effectively. Evaluation by ensuring that the implemented change will sustain over time is part of the final stage of the change process. Analysis of its effectiveness will include continuous application of scientific evidence-based practices (Wojciechowski et al., 2016).

Changing as Three Steps

The three concepts of Lewin's Change Theory are "driving forces," "restraining forces," and "equilibrium" (Petiprin, 2016). The first concept, Driving Force is the force that facilitates change by driving or pushing the person causing a shift in equilibrium in a direction leading to change. The forces that oppose the driving forces hinder the person by driving the person towards the opposite direction and cause a shift in the equilibrium identified as the Restraining Forces (Petiprin, 2016). The *equilibrium* is a state in which both the driving and restraining forces are equal and no occurrence of change but can be raised or lowered caused by the driving and restraining forces.

Unfreezing is a stage where a method is used making it possible for a person to release old patterns of behavior. Lewin proposed that unfreezing can be attained by using the three methods; increasing driving forces that drive behavior away from the current situation, reducing negative movement from the restraining movement, and lastly, a combination of the first two

methods (Batras, Duff, & Smith, 2016). The second stage known as the "change stage" entails a process of change in behavior, feelings, or thoughts and can include all of these three; this stage is also called "moving to a new level." Refreezing implies a "standard operating procedure" in which there is an acknowledgment and establishment of the change as a new habit (Batras, Duff, & Smith, 2016). Establishing this final stage is crucial as a person can quickly return to the old habits. Lewin's goal for the Change Theory is to explore ways or methods to modify the equilibrium towards the direction of desired change (Wojciechowski et al., 2016).

Application of Theory to the DNP Project

The Change Theory developed by Kurt Lewin best addresses this DNP project. Reducing antibiotic prescribing requires a continued effort. Increased knowledge among the providers on the effects and strategies to decrease prescribing practices plays a role in bringing change to current inappropriate antibiotic prescribing. Changing one's clinical practices can be difficult and challenging. However, education and evidence-based ABTG implementation will influence the providers towards the direction of change. For this DNP project, Lewin's CATS will be the theoretical framework for the implementation of the provider education to guide appropriate treatment regimens for acute bronchitis at the project site. The application of the Change theory to the DNP project will be elucidated later in this paper.

The Change theory can be applied to this DNP project in which a motivation to learn will be reinforced by providing education to the providers, taking into account all the forces that will work relating to understanding the health problem of inappropriate antibiotic prescribing of antibiotics for acute bronchitis. The education process for the providers at the host site regarding the strategies for appropriately prescribing practice is a way of imparting knowledge and understanding of the health practice issue.

An implementation of an evidence-based ABTG will serve as the stabilization of the new equilibrium for change to decrease in antibiotic prescribing. The evidence-based guideline will ensure and assist the providers in the host site to sustain the new prescribing practice. This DNP project aims to achieve a reduction in unnecessary antibiotic prescribing. The implementation of the ABTG at the project site will guide clinicians towards appropriate treatment regimens.

The major tenets of the Change Theory also apply to the implementation of the DNP project. The cultivation of the providers' willingness at the project site to listen and receive education to understand the effects of inappropriate antibiotic prescribing depicts the tenets of *openness to uncertainty* and *understanding health as a process*. Eventually incorporating the evidence-based ABTG reflects the applicability of the major tenet of *scientific inquiry* in the DNP project.

The purpose of this quality improvement DNP project is to reduce antibiotic prescriptions for acute uncomplicated bronchitis by educating the clinicians and implementation of ABTG in an Urgent Care Facility. The Change theory developed by Lewin can be applied to this process. The three stages as mentioned above fits the DNP project. The *Unfreezing stage* refers to the development of a method or way for the clinicians in the host site to let go of the old pattern of treating most respiratory infections with antibiotics. Providing learning education for the clinicians regarding the need to change their practice of antibiotic prescribing is one of the methods that can be used. The education will assist providers to have a better understanding of the current practice and its effects. This educational strategy will trigger the thoughts of the clinicians on the need for the change.

The second stage of the theory encompasses a change in behavior or executing a move that will be more effective that will drive the providers in the direction of change. In addition to

the education for the providers on strategies to limit, decrease and delay antibiotic prescribing, the incorporation of an algorithm by the providers will also serve as a tool for the clinicians to provide education to their patients and reinforcement for the change to occur in antibiotic prescribing.

The last stage of the theory, a standard operating procedure which is the ABTG will be established in the host site. Education session and distribution of the printed handouts as well as the development of a policy will be the motivation to carry on and maintain the change in practice.

Project Design

The DNP project ABTG is designed as a quality improvement (QI) project with the intent to decrease unnecessary antibiotic prescribing by providers (medical doctors, physician assistants, and nurse practitioners) in an outpatient urgent care clinic. The pre-implementation and post-implementation chart audits will determine if the intervention provided resulted in a decrease in the rate of antibiotics prescribed by providers for signs and symptoms that do not reflect necessity for antibiotics. The questionnaire *Clinicians' knowledge towards antibiotic prescribing* will be used in in this DNP quality improvement project. The providers at the practice site will be notified of the educational intervention session including the time, location and the topic through a memorandum (Appendix H) posted at the practice site. The intervention includes educational training and the completion of a questionnaire before and after educational training by the participants. The questionnaire will be distributed to assess provider background knowledge on acute bronchitis. The questionnaires will be anonymous and be placed in an envelope to be kept in the provider's office locked file cabinet.

Data will also be collected from the practice site's electronic medical record system by auditing 40 patient records meeting the criteria of upper respiratory infection during the pre-intervention phase prior to the provider training sessions and again approximately four weeks following the intervention. A collection of another retrospective sample of 40 patient record will be analyzed to determine antibiotic prescription rates for patients meeting the criteria for upper respiratory symptoms. A statistical comparison of the prescribing data collected to determine antibiotic prescription rates will be performed followed by dissemination of the quality improvement findings.

The population of interest in this QI project will be the providers implementing the interventions. The patient records that will be audited in this project include those patients seeking medical care at the practice site and are between the ages of 18 and 65 years. This DNP QI project variables include: antibiotic prescription rates, knowledge levels of practitioners, and protocol compliance. The calculated cost of this project including the presentation printed handouts/posters, powerpoint presentations, snack, and refreshments is three hundred dollars. The amount of time the providers and stakeholders who participate in the educational session includes a one-hour presentation to be held for three separate days. A presentation of an evidence-based algorithm, education on the appropriate antibiotic use for acute respiratory infection in adults, and the introduction of the ABTG will be provided through a powerpoint presentation after conducting the questionnaire (Appendix D) to determine providers' attitudes and perceptions on acute bronchitis, antibiotic prescriptions and towards the intervention (quality improvement). The purpose of this project implementation is to reduce antibiotic prescriptions for acute uncomplicated acute bronchitis. The implementation of a new evidence-based protocol

guideline for acute bronchitis (Appendix G) for the providers at the practice site will increase knowledge and better decision making to decrease unnecessary antibiotic prescription practices.

Population of Interest, Setting, Stakeholders, & Recruitment Methods

This QI project is a community-based focus that aims to change provider prescribing practices on antibiotics for acute uncomplicated acute bronchitis. This DNP project will be implemented in a small Southern California outpatient urgent care facility. The project site is staffed by medical doctors, physician assistants, nurse practitioners, and medical assistants.

The population of interest will be the providers at the practice site. The healthcare providers consists of two medical doctors, two physician assistants, and two nurse practitioners. The practice site serves individuals who are insured, uninsured, and a homeless population that lives within the rural area. The range of education levels within this population are high school, middle school, and college. The patients at the practice site are secondary to the project outcomes. The chart audits will include those records with patients that are ages 18 to 65 years old with a diagnosis of acute bronchitis. Exclusion criteria for chart selection include patients under the age of 17 and patients with a diagnosis of COPD, cancer, pulomonary fibrosis and other chronic diseases. During the fall and winter seasons, the practice site tends to encounter patients with upper respiratory tract infections due to the cold weather. The stakeholders (medical doctors, physician assistants, and nurse practitioners) at the practice site agreed that decreasing antibiotic prescriptions for acute uncomplicated bronchitis is the appropriate way to manage the acute illnesses.

The practice site currently has six healthcare providers consisting of physicians, physician assistants, and nurse practitioners. The population of interest for this quality improvement project includes providers with prescribing privileges who have direct

involvement in care assessments and prescribing medications. Determination for participation of the providers will be through a posted memorandum in the practice site. The DNP project is a practice site initiative and therefore, all the practice site providers wil be receiving the training on new practices. The key stakeholders of this quality improvement project are the medical doctors, physician assistants, and the nurse practitioners, and the practice site manager.

Tools/Instrumentation

The tools used in this DNP project will include a questionnaire that measures knowledge levels of clinicians and antibiotic prescribing (Appendix D) (Thakolkaran, Shetty, D'Souza, & Shetty, 2017). The source including the desired questionnaire indicates a copyright and license disclaimer that states an open access article permitting unrestricted use, distribution, and reproduction in any medium, provided the original work will be properly cited (see Appendix G) (Thakolkaran et al., 2017). The quantitative close-ended questions are measured using a dichotomous scale. The survey tool was developed for prudent use of antibiotics (Thakolkaran et al., 2017). The tool was used to assess most common clinical problems antibiotics are prescribed for and the most common anitbiotics being prescribed (Thakolkaran et al., 2017).

In addition to the questionnaires the following algorithm which will be distributed through printed handouts, will be used: Evidenced-Based Management of Acute Respiratory Infections (Appendix C) which also indicates an information regarding copyright indicating that it may be used and reproduced as long as the material source is properly cited (Gonzales et al., 2013). The algorithm entails an evidence-approach to assess upper respiratory infections in adults with a cough. The previously mentioned questionnaire (Appendix D) will be used to evaluate the project site's providers' understanding and attitudes towards prescribing antibiotics for acute bronchitis. These questionnaires have the same set of questions. The pre-test

questionnaire is provided to capture providers demographic also. Both the pre-test and post-test questionnaires measure clinician's knowledge towards antibiotic prescribing with two sets of questions which include case scenarios and knowledge questions regarding antibiotics prescription practice.

In addition, the project will include an educational intervention through a powerpoint presentation. The project lead will provide educational sessions for clinicians at the practice site. The education sessions will include information on CDC guidance for appropriate antibiotic use for acute bronchitis (Harris et al., 2016). Additional tools for this project will include the following handouts: American College of Physicians (ACP) and the CDC's, Antibiotic Prescribing Strategy Advice for an Adult patient with Acute Respiratory Tract Infection (Appendix E) (Harris et al., 2016). These handouts will be provided to the providers the educational sessions.

Data Collection Procedures

There will be a comparison between the antibiotic prescription practice of the providers for acute bronchitis before and after the implementation of evidence-based ABTG protocol and educational sessions. An expected outcome is to demonstrate a decrease in rates of antibiotic prescriptions for acute bronchitis three weeks after the implementation of the interventions. Participant baseline knowledge on antibiotic prescribing through the pre-test scores will be summarized as a mean standard deviation for continuous variables and percentage for the categorical variables. The data collected from the pre-test and post-test questionnaires will be compared to determine a change in the background knowledge and practice of the practitioners after the educational session. Privacy and confidentiality is assured, the interviews and questionnaires will remain anonymous and the providers will not be writing their names while

answering the questionnaire. The IBM Statistical Package for the Social Sciences (SPSS) Version 24 and Microsoft Excel will be used in data collection and analysis.

The objectives that will be achieved in the data collection are as follows:

1. Implement an evidence-based ABTG for providers to follow in treating patients' presenting with signs and symptoms of acute bronchitis and upper respiratory infections. An ABTG will be established and implemented for the pactice site's providers to utilize when treating acute bronchitis.

2. The DNP student will implement a robust provider/clinician specific training program for all staff who retains prescriptive rights. Training will be provided after the provider's complete the pre-intervetion questionnaire. Educational training using a Power Point presentation will be provided to the practice site providers. Post- survey intervention questionnaires will be collected after the educational training.

3. The providers/clinicians at the host site will follow an evidence-based algorithm for guidance while making antibiotic prescription decisions. Re-evaluation of the implemented intervention will be performed using the practice site's electronic medical record, to collect a retrospective sample of approximately 40 medical records of patients who were treated and had an acute bronchitis diagnosis. This would be used to determine if prescribing rates have changes.

4. Decreased rates of antibiotic prescription use related to the diagnosis code of Acute Bronchitis will be determined by a comparison of prescriptive rates in a retrospective sample of 40 medical records before the intervention and another restrospective sample after the intervention.

Project Timeline

The project timeline is six weeks. The timeframe includes implementation of the project intervention, data collection and analysis/interpretation. The project implementation will start at the beginning of DNP III. Project approval will be obtained at the end of DNP II.

Week one will include posting of an informative memorandum in the project site's provider office and in the break room. The project is a practice change initiative and is mandatory to all project site providers. In week two, participant numbers will be determined (two physicians, two physician assistants and two nurse practitioners). There will also be a collection of 40 medical records of patients who had been diagnosed with acute bronchitis which will be compared to the second collection of 40 retrospective samples of medical records to determine if there was a change in antibiotic prescription rates. In week three, the project will be initiated through educational training and the ABTG will be implemented. In week seven, data collection of another 40 medical records and data analysis pertaining to prescriptive rates will be implemented. This is outline in the table below:

Week 1	Memorandum regarding the DNP project will be posted in the project site for mandatory participation for the quality improvement educational training.
Week 2	Schedule and time of educational training will be determined. Collection of a retrospective sample of 40 patient records of patients having an acute bronchitis diagnosis.
Week 3	Completion of pre-and post-education questionnaires, educational sessions, implementation of ABTG will be completed during this time. An analysis of the data gathered through the pre- and post-questionnaires will also be initiated.
Week 7	Another data collection of a retrospective sample of another 40 patient medical records that meet the same criteria after the intervention. Data analysis plan will be conducted. Analysis of data collected to determine whether a decreased rate of antibiotic prescriptions was evident among patients diagnosed with acute bronchitis following provider training of the antibiotic protocol/procedure.

Two phases of the Project Design and two populations of interest summarized below:

Phase I	Phase II
Education/ implementation phase **Population of interest:** The practice site practitioners receiving education a.) two physicians b.) two nurse practitioners c.) two physician assistants	**Measuring impact on patients' through chart review (Phase II)** **Population of interest:** Patients who qualify with a diagnosis of acute bronchitis
Data Analysis: Paired samples *t*-test will be used for phase I	**Data Analysis:** Chart review analysis will be the Paired samples *t*- test and the creation of a contingency table form to determine differences in prescribing practices before and after the intervention.

Ethics/Human Subjects Protection

This DNP project is a QI initiative. The project will directly involve the practice site providers and indirectly affect the patients at the practice site. Participation of the practice site providers for the education training is required as this DNP project is a QI initiative. The provider names will remain anonymous during the collection of retrospective samples of the 40 medical records of patients receiving the diagnosis of acute bronchitis before and after the educational training session. Provider names will not be gathered during the data collection. The pre-test and post-test questionnaires will not contain identifying information about the practice site participating providers. The questionnaires will be collected and be placed in an envelope to be given to the project lead and will not be opened for analysis until all providers have completed both the post and pre-test questionnaire. Providers will not be singled out based on specific answers to the questionnaires. There will be no patient involvement in the education sessions; however, brochures for patients will be given to the providers for their patients. The

Institutional Review Board (IRB) process at Touro University will be followed. This is a quality improvement project and will likely not require a full IRB review.

Plan for Analysis/Evaluation

Evaluation of the intervention will be determined in week seven, four weeks following the provider training. A collection of a retrospective sample of 40 medical records obtained from practice site electronic medical record of patients who have acute bronchitis diagnosis and were treated in the practice site will be compared to the retrospective sample of 40 medical records collected prior to the intervention. The findings will determine if prescribing rates for acute bronchitis have changed. This DNP QI project expected completion is one-month time frame. The dependent variables are;

a. Antibiotic Prescription Rates

b. Practitioner Knowledge levels

The independent variable is the training provided and implementation of Acute Bronchitis Treatment Guideline (ABTG).

The data collected from the completed pre-test and post-test questionnaire will be compared to determine if a change in provider knowledge is achieved using Paired Samples *t*-Test. The Microsoft Excel and the IBM SPSS Version 24 will be utilized in data collection. The data collected from the pre- and post-intervention questionnaires, which relates to the primary care physician (PCP) knowledge levels will be analyzed using the Paired-Samples *t*-Test. The impact on antibiotic prescription rates collected through chart review will be analyzed using the Paired-Samples *t*-Test and a contingency table form will determine if an increase in practice site provider knowledge has occurred and whether antibiotic prescription rates have decreased after the intervention.

Significance and Implications for Nursing

Practice Guidelines

The American Association of Colleges of Nursing (AACN) established the Essentials of Doctoral Education for Advanced Nursing Practice which serves as the foundational competencies that will allow DNP prepared nurses to practice the role of the Doctor of Nursing Practice (AACN, 2006). The completion of this DNP project highlights the DNP role in advancing and improving patient quality care.

As the largest professional and the most trusted profession in 2017, nurses have a higher opportunity to influence the healthcare system and improve the quality of their patients' lives by incorporating education to their patients, and the public and adopting recommended evidence-based treatment guidelines into their practice (American Organization of Nurse Executives, 2018). This project aims to achieve a decrease in antibiotic prescriptions for acute bronchitis after the implementation of the DNP quality improvement project. This quality improvement project aims to achieve a decrease in antibiotic prescriptions for acute bronchitis through increasing the provider's knowledge and application of evidence-based acute bronchitis treatment guideline (ABTG).

Prescribing Practices

The nursing profession embraces collaboration and innovation to achieve patient safety and decreasing antibiotic prescription as one of the many leading roles of the profession. The identification of the significance of the impact of antibiotic resistance on healthcare and the identification of the role of education in decreasing inappropriate antibiotics is significant in influencing prescribing habits of the practice providers (Harris et al., 2016). The utilization of existing evidence-based guidelines and algorithms to educate practice site providers will improve

the judicious use of antibiotics (Gonzales, et al., 2013). Changing the prescribing practices of the providers who participate in this quality improvement project is expected to contribute to better management of acute bronchitis and improve patient safety.

Provider Education

The importance of consistent development, revision and implementation of evidence-based guidelines and policies within healthcare organizations as highlighted in this DNP project contributes to achieving a decrease in antibiotic prescription for acute bronchitis (Gidengil, et al., 2016). A delay in prescribing antibiotics for acute bronchitis is an effective approach to decrease the overuse of antibiotics (Fiore, et al., 2017). Continuing education to healthcare providers and patients to increase the understanding that antibiotics will not likely make a difference to their viral symptoms is an essential part of care (Ackerman, et al., 2013). The findings of this DNP project determine if the practice site providers change their antibiotic prescribing practices which can contribute to the global health priority in reducing inappropriate antibiotic prescribing (AHRQ, 2016).

Data Analysis

Data from the pre-intervention and post-intervention questionnaires that were completed during the educational sessions with the providers were compared to determine whether there was a significant change in practitioner knowledge levels regarding prescriptive practices for acute bronchitis. The data collected from these questionnaires was analyzed using a Paired Samples *t*-Test through IBM SPSS version 24. The data from the evaluation of the questionnaires was analyzed quantitatively.

Forty patients' medical records were collected during the pre-implementation phase, however, to date; there are not enough patient records to complete forty patient records during

the post-implementation due to time limitation. Twenty-six patient records were collected post-implementation and were analyzed using Paired Samples *t*-Test to compare provider- prescribing rates from pre-intervention with the post-intervention antibiotic prescribing rates for acute bronchitis. Of the 40 patient records that were collected prior to the project intervention, 17 of the patients with an acute bronchitis diagnosis received an antibiotic prescription. This translates to a 42.4% prescribing rate prior to intervention. Of the 26 patient records that were collected following intervention with providers, eight had received an antibiotic prescription which dropped the prescription rate to 30.8% (Appendix K). Based on the data collected, the providers utilized the ABTG in their decision in treating patients with acute bronchitis with 69.2% of the patients. However, verbal communication and feedback were obtained from the providers where they mentioned that they utilized the ABTG when they made decisions in treating acute bronchitis during post-intervention.

Results

There were a total of six providers that are employed and working at the project site who participated in the education session and 100% of the providers completed the pre- and post-questionnaires. The participants were two MDs, two NPs, and two PAs. A Paired Samples *t*-Test was performed to evaluate whether there were significant differences between the pre-intervention and post-intervention *Clinicians Knowledge towards Antibiotic Prescribing* questionnaire scores. The scoring percentage of the pre-intervention questionnaire was a mean of 89.74% (SD = 9.32). The scoring percentage of the post-intervention questionnaire was a mean of 100% (SD= 0.000). The increase in the knowledge questionnaire score was 10.26%. A significant improvement in knowledge questionnaire was noted with paired t (5) = -2.697, p =.043. The data analysis is reported in Appendix K.

All healthcare providers who have prescriptive rights participated in the quality improvement initiative and agreed to adopt the ABTG. A total of 100% of the participants attended the education session and completed the pre-intervention and post-intervention questionnaires. Prior to initiation of the protocol, the project site antibiotic prescription rate for acute bronchitis was 42.4%. This percentage reflects data gathered from a retrospective population of 40 health records of adult patients with the diagnosis of acute bronchitis prior to implementation. The results were compared to post-implementation prescription rates collected from the electronic health record of patients with acute bronchitis diagnosis. The post-implementation antibiotic prescription rates resulted in a drop prescription rate to 30.8% reflected from another 28 health records of adult patients with the diagnosis of acute bronchitis. The DNP project results showed that the provider education, pre-intervention, and post-intervention questionnaires improved the project site providers' knowledge. All the providers'/participants acknowledged that the introduced quality improvement initiative provided information in managing acute bronchitis is applicable to their practice.

Discussion of the Findings

The DNP quality improvement project findings showed that an education intervention had an impact in significantly improving the provider's knowledge in delaying antibiotic prescribing for acute bronchitis. The data collected supports that the educational intervention which included the PowerPoint presentation, distribution of handouts, the pre-test and post-test questionnaires increased the providers' knowledge. The educational intervention led to the project site participants' acknowledgment of the likelihood in adopting the ABTG when treating acute bronchitis. According to Shetty et al. (2017), the improved awareness of antimicrobial resistance patterns and knowledge in antibiotics, as well as implementation of standard treatment

guidelines, allows judicious use of antibiotics. Improving providers' knowledge and awareness regarding delayed antibiotic prescribing leads to a decrease in unnecessary antibiotic prescribing for acute bronchitis.

Current research suggests that antibiotic prescribing can be decreased through provider education and increasing awareness of the antibiotic resistance (Ackerman et al., 2013). The educational intervention utilized in this DNP quality improvement project along with the pre-intervention and post-intervention questionnaires and the implementation of an evidence-based algorithm are strategies used to improve providers' knowledge. The educational PowerPoint includes information regarding antibiotic resistance, information regarding acute bronchitis, and strategies to reduce antibiotic use offered the participants/providers' awareness which contributed to a positive response in the possible adaptation of the ABTG in the providers' practice. The pre-intervention and post-intervention questionnaires allowed the participants to apply the learned intervention into their practice. The implementation of the evidence-based algorithm at the project site was followed by the providers' which was determined through the collection of 40 patient records during the pre-intervention phase and another 26 patient records during the post-intervention obtained. The data collected revealed a decrease of 11.6% in antibiotic prescriptions for acute bronchitis; therefore, a change in prescribing rates did occur. The decreased rates of antibiotic prescription use for acute bronchitis diagnoses determined through compared antibiotic prescriptive rates of 40 medical records prior to intervention and another 26 patient records post-intervention. Discussions occurred after completing the education intervention.

Significance/Implications for Nursing

Antibiotic prescribing for acute bronchitis remains to be a widespread problem (Fiore et al., 2017). The increase in providers' knowledge and the implementation of the acute bronchitis treatment guideline is expected to decrease unnecessary antibiotic prescribing practices hence to improve patient outcomes (Grigoryan et al., 2017). Provider education regarding complications that are associated with unnecessary antibiotic use, differentiating between viral and bacterial infection, management for uncomplicated acute bronchitis for adults, modifying antibiotic seeking behavior of patients with acute bronchitis, and delayed antibiotic prescribing strategies leads to a decreased in unnecessary antibiotic prescribing for acute bronchitis (Dempsey et al., 2014). These topics were addressed during the DNP project's education sessions with providers. The decrease in antibiotic prescribing will reduce the risk of bacterial resistance and unwanted adverse side effects of antibiotic use. As mentioned previously in this paper, the implementation of an evidence-based algorithm resulted in a decrease rate in antibiotic prescription for acute bronchitis after the DNP quality improvement project. This can be supported through literature and implementation of algorithms and other decision support strategies which reduced antibiotic overuse for acute bronchitis (Gonzales et al., 2013). DNP prepared nurses and healthcare organizations should consider implementing evidence-based protocols and receive continuous training and education for the goal of reducing inappropriate antibiotic prescriptions. The educational training must be supported by current literature and evidence with an update for protocols or guidelines that might already be in place (Dempsey et al., 2014). Implementation of an algorithm conducted in an outpatient setting guides and supports health care providers in their prescribing practices resulting in a reduction of antibiotic prescription rates for acute bronchitis (Gonzales et al., 2013). Continued support to health care providers by implementing or updating

an evidence-based algorithm available also for their patients to visualize in the clinics or hospitals may assist patients in understanding that antibiotics are an unnecessary treatment for acute bronchitis (Fiore et al., 2017). Previous qualitative studies described that future guidelines must also address the role of ongoing education as well as patient-directed materials such as the use of handouts, over-the counter prescription pads, and posters which may further decrease patient demands for antibiotics (Dempsey et al., 2014).

Project Limitations

There are several limitations of this project. One limitation is that the DNP project includes a small sample size of providers at the project site. A larger sample size would allow for a larger set of data to be collected and analyzed, hence will result in an increased reliability and may show a significant difference. Another limitation is that the pre- and post-implementation questionnaires, *Clinicians' Knowledge Towards Antibiotic Prescribing,* may have produced bias results due to the providers' answers which may have been based on what was expected response. In addition, another limitation was that the data collected from the pre-implementation phase was analyzed through a collection of 40 patients' medical records; however, 40 patient records were not available due to time limitation and the season change during the post-implementation phase. Instead there were a total of 26 patient records that were collected during the post-implementation phase which was compared to determine a decrease in the antibiotic prescription rates for acute bronchitis. Ideally, an increase in number of patient chart audits would better provide a larger pool of data to be analyzed and may have showed a significant difference. Lastly, a limitation was the short time frame of the project due to the course requirements. The project implementation was limited to four weeks. A longer period would allow more results that would accurately measure and compare change or decrease in the

antibiotic prescription rates for acute bronchitis. Despite these mentioned limitations, the DNP quality improvement project provided an increase in providers' knowledge through a robust provider/ clinician educational training program, and the ABTG utilized by the project site providers when treating acute bronchitis as based on the data analysis did result in a significant decrease in antibiotic prescriptions for acute bronchitis.

Project Dissemination

Dissemination of findings is considered the last part of the DNP project and is crucial in impacting health care outcomes in the nursing's era of evidence-based practice (Moran et al., 2017). This DNP project was disseminated to the DNP project team, project mentor, content expert, and fellow DNP students via a PowerPoint presentation. The findings were also shared with the project site stakeholders who provided insight into possible approaches required to maintain and to continue to develop the ABTG. Official dissemination of this project will be submitted to the Doctors of Nursing Practice Organization project repository as required by Touro University Nevada. The dissemination of this DNP project will share information with the audience and readers through the DNP student's plan to share project outcomes through presentations during professional conferences, and health related information presentations locally, and staff meetings. The target audience includes fellow DNP students, advanced practice registered nurses, physicians, and nurses including nurse leaders, all from multiple fields. The dissemination of this project will provide information and insights into further development of acute bronchitis treatment guidelines or protocols and aid in determining possible issues that may arise while working towards the goal of decreasing antibiotic prescriptions for acute bronchitis.

Project Sustainability

Sustainability is essential in warranting the progress made through an improvement initiative (Moran et al., 2017). Sustainability of this quality improvement project at the project site can be assured through continuing provider education on current evidence in treating acute bronchitis quarterly or at least bi-annually. A quarterly education session on guideline update will provide more comprehensive training and education for the providers. The project site manager and stakeholders are important resources to create a review of provider compliance with the protocol in place where the DNP student can be of assistance during this process. An additional recommendation would be for data collection to continue and be collected quarterly by the project site manager to determine continued reduction in antibiotic prescription rates for acute bronchitis. This would aid in sustainability of the protocol at the project site.

References

Ackerman, S., Gonzales, R., Stahl, M., & Metlay, J. (2013). One size does not fit all: evaluating an intervention to reduce antibiotic prescribing for acute bronchitis. *BMC Health Services Research, 13*(462), 1-9. doi: 10.1186/1472-6963-13-462

Agency for Healthcare Research and Quality. (2016). Interventions to improve antibiotic prescribing for uncomplicated acute respiratory tract infections. Retrieved from http://effectivehealthcare.ahrq.gov/topics/antibiotics-respiratory-infection/clinician

American Organization of Nurse Executives. (2018). Nurses again top Gallup poll of trusted professions. Retrieved from http://www.aone.org/news/nurses-again-top-gallup-poll-of-trusted-professions

Batras, D., Duff, C., & Smith, B. (2016). Organizational change theory: Implications for health promotion practice, *Health Promotion International, 31(1).* 241, doi:10.1093/heapro/dau098

Centers for Disease Control and Prevention. (2017). Adult Treatment Recommendations. Retrieved from http://www.cdc.gov/antibiotic-use/community/for-hcp/outpatient-hcp/adult-treatment-rec.html

Centers for Disease Control and Prevention. (2017). *Antibiotic prescribing and use in doctor's offices*. Retrieved from http://www.cdc.gov/antibiotic-use/community/index.html

Cummings, S., Bridgman, T., & Brown, K. (2016). Unfreezing change as three steps: Rethinking Kurt Lewin's legacy for change management. *Sage Journals, 69*(1), 33-60. doi:10.1177/0018726715577707

Dempsey, P., Businger, A., Whaley, L., Gagne, J., & Linder, J. (2014). Primary care clinician's perceptions about antibiotic prescribing for acute bronchitis. *BMC Family Practice, 15*(194), 1-10. doi:/10.1186/s12875-014-0194-5

Fiore, D., Fettic, L., Wright, S., & Ferrara, B. (2017). Antibiotic overprescribing: Still a major concern. *The Journal of Family Practice*, *66*(12), 730-736.

Gidengil, C., Mehrotra, A., Beach, S., Setodji, C., Hunter, G., & Linder, J. (2016). What drives variation in antibiotic prescribing for acute respiratory infections? *Journal of General Internal Medicine, 31*(8), 918-924. doi: 10.1007/s11606-016-3643-0

Gonzales, R., Anderer, T., McCulloch, C., Maselli, J., Bloom, F., Graf, T., Stahl, M., Stahl, M., Molecavage, J., & Metlay, J. (2013). A cluster randomized trial of decision support strategies for reducing antibiotic use in acute bronchitis. *JAMA Internal Medicine, 176*(1), 9-21. doi:10.10001/jamainternmed.2015.7088

Grigoryan, L., Zoorob, R., Shah, J., Wang, H., Arya, M., & Trautner, B. W. (2017). Antibiotic prescribing for uncomplicated acute bronchitis is highest in younger adults. *Antibiotics, 6*(4), 22. doi: 10.3390/antibiotics6040022

Harris, A., Hicks, L., & Qaseem, A. (2016). Appropriate antibiotic use for acute respiratory tract infection in adults: Advice for high-value care from the American College of Physicians and the Centers for Disease Control and Prevention. *Annals of Internal Medicine*, *164*(6), 425-434. doi:10.7326/M15-1840

HEDIS Measure. (2018). Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis. Retrieved from http://www.floridablue.com/sites/floridablue.com/files/docs/HEDIS%20Measure%20Acute%20Bronchitis%20900-0246B-0218Approved.pdf

Holmes, L., Struwe, L., & Waltman, N. (2018). Evaluation of an antibiotic stewardship program in a university health center. *The Journal for Nurse Practitioners, 14*(3), 57-61. doi: 10.1016/j.nurpra.2017.11.025

Kinkade, S., & Long, N. (2016). Acute Bronchitis. *American Family Physician, 94(7),* 560-565

Moran, K., Burson, R., & Conrad, D. (2017). *The Doctor of Nursing Practice Scholarly Project* (2nd ed.). Burlington, MA: Jones & Bartlett Learning.

Oesterle, J., Sternemann, M., Sande, T., Aplin, C., & Towers, D. (2016). Antimicrobial resistance education in the primary care setting. *Journal of Doctoral Nursing Practice, 9*(2), 217-225. doi: /10.1891/2380-9418Th2.217

Petiprin, A. (2016). Kurt Lewin - Nursing Theorist. Retrieved from http://nursing-theory.org/nursing-theorists/Kurt-Lewin.php

The American Association of Colleges of Nursing. (2006). The Essentials of Doctoral Education for Advance Nursing Practice. Retrieved from http://www.aacnnursing.org/Portals/42/Publications/DNPEssentials.pdf

The PEW Charitable Trusts. (2016). Antibiotic use in outpatient settings. Retrieved from http://www.pewtrusts.org/en/research-and-analysis/reports/2016/05/antibiotic-use-in-outpatient-settings

Terry, A. (2017). Do clinical decision support systems reduce inappropriate antibiotic prescribing for acute bronchitis? *On-Line Journal of Nursing Informatics, 21*(1). doi:1984370276?accountid=134061

Thakolkaran, N., Shetty, A., D'Souza, N., & Shetty, V. (2017). Antibiotic prescribing knowledge, attitudes, and practice among physicians in teaching hospitals in South India.

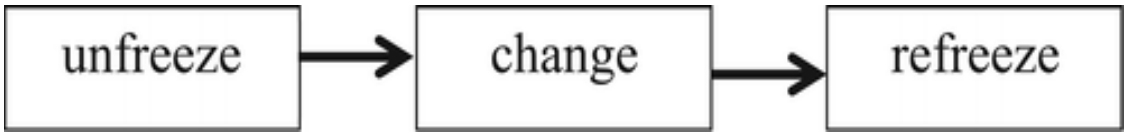
Journal of Family Medicine and Primary Care, 6(3), 526-532. doi:10.4103/2249-4863.22057

Wojciechowski, E., Pearsall, T., Murphy, P., & French, E. (2016). A case review: Integrating Lewin's theory with lean's system approach for change. *Online Journal of Issues in Nursing, 21*(2), 4-6.doi: /10.3912/OJIN.Vol21No02Man04

World Health Organization. (2015). Global action plan on antimicrobial resistance. Retrieved from http://www.who.int/antimicrobial-resistance/publications/global-action-plan/en/

Appendix A

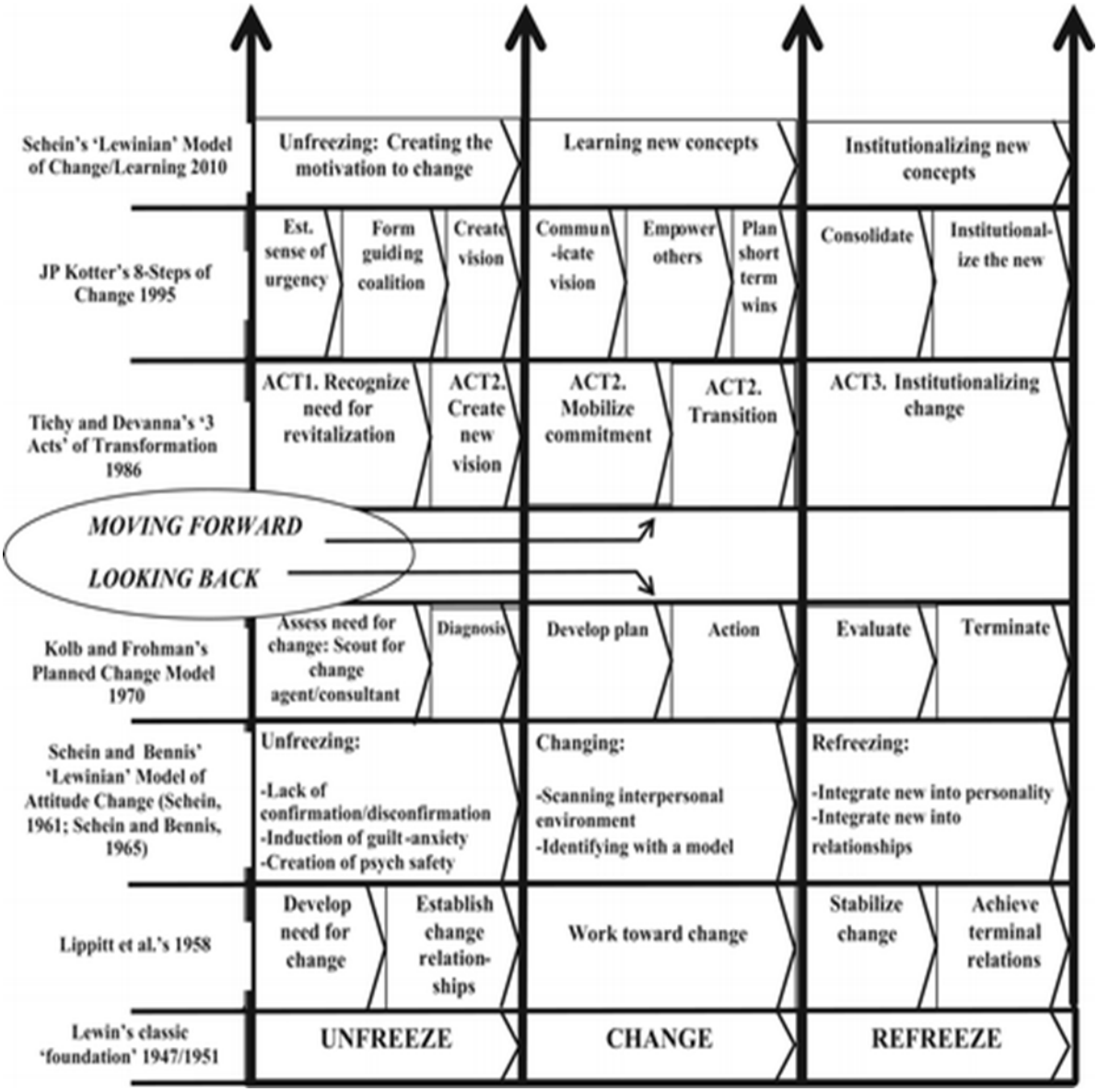
Change as Three Steps (CATS)



(Cummings et al., 2016)

Appendix B

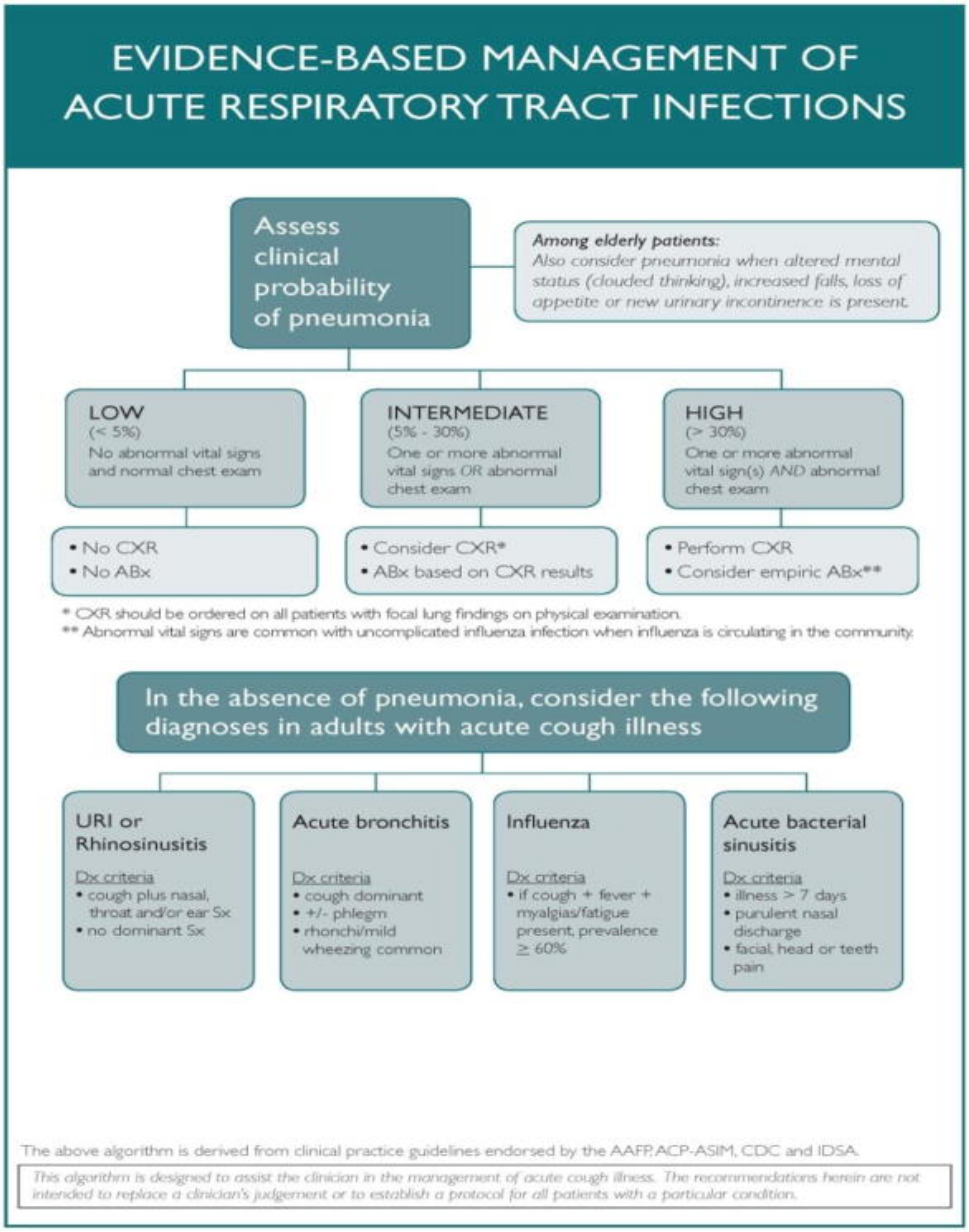
CATS as Grand Foundation



(Cummings et al., 2016)

Appendix C

Evidence-Based Algorithm



(Gonzales et al., 2013)

Appendix D

Questionnaire 1 (Pretest-Posttest)

Clinicians' knowledge towards antibiotic prescribing

Clinical Scenario: Are antibiotics justified in the following Clinical scenarios?	Agree	Disagree
Case A **Acute bronchitis/ cough illness for 5 days with purulent sputum; no fever; normal lung examination**		
Case B **Watery diarrhea for 3 days; not foul smelling; no fever; otherwise normal examination**		
Case C **Upper respiratory tract infection, purulent nasal discharge for 5 days; no fever; no cough; otherwise normal examination**		

(Thakolkaran et al., 2017)

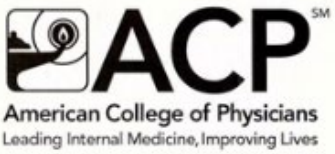
Questionnaire 2 (Pretest-Posttest)

Question	Agree	Disagree
Patients will have reduced risk of antibiotic resistant infections if prescribed fewer antibiotics?		
The commensal flora of the gut is considered the most important		

reservoir for antimicrobial resistance genes in both community and hospital environment?		
Do you prescribe antibiotic due to a purulent discharge?		
Do you prescribe antibiotic due to a diagnostic uncertainty?		
Do you prescribe antibiotic due to a treatment uncertainty?		
Do you prescribe antibiotic due to patient request/ expectation?		
Do you prescribe antibiotic due to presence of fever?		
Do you prescribe antibiotic for patient satisfaction? **Do you prescribe antibiotic based on standard treatment guidelines**		
Do you prescribe antibiotic for drug promotion?		

(Thakolkaran et al., 2017)

Appendix E



SUMMARY OF THE AMERICAN COLLEGE OF PHYSICIANS AND CENTERS FOR DISEASE CONTROL AND PREVENTION ADVICE FOR HIGH-VALUE CARE ON APPROPRIATE ANTIBIOTIC USE FOR ACUTE RESPIRATORY TRACT INFECTION IN ADULTS

Disease/Condition	Acute respiratory tract infection (ARTI)
Target Audience	Primary care providers, emergency medicine providers
Target Patient Population	Healthy adults
Intervention	Reduction in antibiotic prescriptions
Evidence That Using Antibiotics in Patients With ARTI Does Not Improve Outcomes	Multiple randomized clinical trials have shown that antibiotics are ineffective for most ARTIs. There is no benefit for patients with the common cold or acute uncomplicated bronchitis and limited benefit for patients diagnosed with bacterial rhinosinusitis.
Harms of Using Antibiotics	Annual direct costs are $6.5 billion and annual indirect costs are >$30 billion in the United States. Antibiotics are responsible for 1 of every 5 emergency department visits for drug-related complications. Complications occur in 5% to 25% of patients who use antibiotics. Antibiotic-associated diarrhea caused by *Clostridium difficile* is the most common serious complication, responsible for 29 300 deaths in the United States per year.
Approaches to Overcome Barriers to Evidence-Based Practice	Multidimensional approaches involving active clinician education work best to reduce antibiotic prescriptions, including physician and patient education, physician audit and feedback, delayed antibiotic prescriptions, health information technology, and financial or regulatory incentives.
Talking Points for Clinicians When Discussing the Use of Antibiotics in Patients With ARTI	The average adult has 2 to 3 episodes of ARTI per year. Symptoms usually resolve in 1 to 2 weeks, but cough can last up to 6 weeks. Symptomatic treatment tailored to patient preferences may provide relief. Antibiotics do not cure most ARTIs or reduce time to resolution of symptoms. Antibiotics cause many serious adverse effects and should be reserved for patients with confirmed group A streptococcal pharyngitis.
High-Value Care Advice	High-Value Care Advice 1: *Clinicians should not perform testing or initiate antibiotic therapy in patients with bronchitis unless pneumonia is suspected.* High-Value Care Advice 2: *Clinicians should test patients with symptoms suggestive of group A streptococcal pharyngitis (for example, persistent fevers, anterior cervical adenitis, and tonsillopharyngeal exudates or other appropriate combination of symptoms) by rapid antigen detection test and/or culture for group A* Streptococcus. *Clinicians should treat patients with antibiotics only if they have confirmed streptococcal pharyngitis.* High-Value Care Advice 3: *Clinicians should reserve antibiotic treatment for acute rhinosinusitis for patients with persistent symptoms for more than 10 days, onset of severe symptoms or signs of high fever (>39 °C) and purulent nasal discharge or facial pain lasting for at least 3 consecutive days, or onset of worsening symptoms following a typical viral illness that lasted 5 days that was initially improving (double sickening).* High-Value Care Advice 4: *Clinicians should not prescribe antibiotics for patients with the common cold.*

(Harris et al., 2016

Appendix F

Permission Letter to Reproduce Survey Questionnaire

January 17, 2019

Dr. A. Veena Shetty

Department of Microbiology

Hedge Medical Academy

Karnataka, India

Dear Dr. Veena Shetty,

My name is Joann Siapno. I am a Doctoral of Nursing Practice (DNP) student from Touro University Nevada, USA writing my DNP project titled Decreasing Antibiotic Prescribing for Acute Bronchitis in Urgent Care: A Quality Improvement under the direction of my DNP Project Chaired by Dr. Tamara Mette, and DNP Project Member Dr. Judith Carrion.

I would like your permission to reproduce to use your survey instrument in my DNP project. The survey from:

Thakolkaran, N., Shetty, A., D'Souza, N., & Shetty, V. (2017). Antibiotic prescribing knowledge, attitudes, and practice among physicians in teaching hospitals in South India. *Journal of Family Medicine and Primary Care, 6*(3), 526-532. doi:10.4103/2249-4863.22057

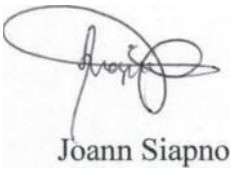
I would like to use and print your survey under the following conditions:

- I will use this survey questionnaire only for my DNP project and will not sell or use it with any compensated or curriculum development activities.

- I will include the copyright statement on all copies of the instrument

If these are acceptable terms and conditions, please indicate so by signing one copy of this letter and returning it to me either through e-mail or postal mail, joannsiapno2@gmail.com or dnp19b.joannsiapno@nv.touro.edu. My postal address is PO BOX 1554 Monrovia, California, USA 91017-5554.

Sincerely,



Joann Siapno
Touro University
Nevada DNP
Student

I grant permission requested on the terms stated in this letter.

Agree to and accepted: _____

Date: _____

Appendix G

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J Family Med Prim Care. 2017 Jul-Sep; 6(3): 526–532.
doi: 10.4103/2249-4863.222057

PMCID: PMC5787949
PMID: 29417002

J Family Med Prim Care

Antibiotic prescribing knowledge, attitudes, and practice among physicians in teaching hospitals in South India

Nimmy Thakolkaran,[1] A. Veena Shetty,[1] Neevan D. R. D'Souza,[2,3] and Avinash K. Shetty[4]

Author information Copyright and License information Disclaimer

Appendix H

Acute Bronchitis Treatment Guideline

Effective Date: March 26, 2019

Acute Bronchitis Treatment Guideline

Purpose:

Acute Bronchitis Treatment Guideline (ABTG) provides healthcare professionals within this healthcare organization to optimize the use of antibiotics. The objective of this (ABTG) is to reduce inappropriate antibiotic use, improve patient care outcomes, and mitigate adverse consequences of antibiotic use including antibiotic resistance, preventable patient harm, and unnecessary costs associated with pharmaceutical expenses and drug- resistant infections. This guideline details the acute bronchitis framework and establishes key principles around antibiotic prescribing and management.

Scope:

This Acute Bronchitis Treatment Guideline applies to all clinical staff in this organization.

Policy Statement:

This guideline establishes key directives for antibiotic prescribing and management with particular reference to antibiotic prescribing processes, management of antibiotic formulary and restrictions, use of evidence-based therapy, and access to expert clinical advice.

Procedure:

Principles of Antibiotic Prescribing

All prescribers within this organization are expected to prescribe antibiotic therapy according to the following key principles:

- Therapeutic decisions regarding the prescription of antibiotics will be based on evidence-based

Acute Bronchitis Treatment Guideline

guidelines.

- Decisions take into consideration local antibiograms when they are available.
- When pathogen is known antibiotics are prescribed according to microbiology and susceptibility reports when available.
- Prescribed antibiotics will be of the narrowest spectrum possible for achieving the intended effect.
- Dosage, route and frequency of prescribed antibiotics will be appropriate for the individual patient, as well as the site and type of infection.
- The duration of antibiotic therapy will be defined and/or regularly reviewed (based on evidence-based guidelines and clinical improvement).
- If a patient is prescribed antibiotic therapy that is not in concordance with either locally endorsed guidelines or evidence-based guidelines, the prescriber is expected to document his or her clinical reasoning in the patient's notes, chart or electronic medical record.

Acute Bronchitis Treatment Guideline

Acute Uncomplicated Bronchitis (Adults)

This guideline is not intended for patients with chronic bronchitis, COPD, or other serious comorbidities.

Symptoms and Diagnosis

- Most common for adult patients visit is Cough. Acute bronchitis is the most common diagnosis in patients who represents with cough.
- Evaluation should focus on ruling out pneumonia, which is rare among otherwise healthy adults in the absence of abnormal vital signs (heart rate ≥ 100 beats/min, respiratory rate ≥ 24 breaths/min, or oral temperature≥ 38 °C) and abnormal lung examination findings (focal consolidation, egophony, fremitus).
- Colored sputum does not indicate bacterial infection.
- For most cases, chest radiography is not indicated.
- Cough for 1-3 weeks (may linger up to 6-8 weeks).
- May have wheezing or rhonchi on chest exam, but NOT rales or signs of consolidation.
- Low grade fever (common early in the illness)
- Term "chest cold" rather than bronchitis may reduce expectation for antibiotics

Consider Pertussis

Treat and test for Pertussis with PERSISTENT COUGH when any of the following symptoms are present:

- Inspiratory whoop
- Paroxysms
- Exposure to known pertussis case
- Pertussis is circulating widely in the community

NOTE: See California pertussis update at:
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx

Ruling out PNEUMONIA

Assess oxygen saturation in addition to vital signs.
Pneumonia is UNLIKELY in healthy immunocompetent adults < 70 years without:

- Heart rate > 100 bpm
- Respiratory rate > 24 bpm
- Oral temperature > 38°C (100.4°F)
- Abnormal chest exam (rales, egophony, tactile fremitus, or dullness to percussion)
- Infiltrate on chest x-ray

Acute Bronchitis Treatment Guideline

When to consider Chest X-Ray:

Signs/symptoms or suspicion of pneumonia:

- Cough not improving after > 6-8 weeks
- Abnormal oxygen saturation, vital signs, or chest exam
- Fever > 4 days, or recurrent fever after having resolved for > 24 hours, Oral body temperature > 100°F (37.8°C)
- Dyspnea, bloody sputum, or rusty sputum color
- Pulse > 100 beats per minute
- Respiratory rate > 24 breaths per minute
- Focal consolidation, egophony, or fremitus on chest examination
- History of smoking

NOTE: Treat pneumonia with antibiotics.

Treatment

Symptomatic Treatment

- Cough suppressants (codeine, dextromethorphan);
- First-generation antihistamines (diphenhydramine);
- Decongestants (phenylephrine).
- Extra rest, hot drinks, oral hydration.
- Analgesics/antipyretics, as needed.
- Consider bronchodilators if history of asthma.
- Inhale steam from shower or bath to loosen secretions.
- Avoid cigarette smoke; offer smoking cessation resources, if indicated.

Offer positive recommendations using this Symptomatic Prescription Pad: https://www.cdc.gov/antibiotic-use/community/materials-references/print-materials/hcp/index.html

NOTE: Evidence supporting specific symptomatic therapies is limited.

Avoid Antibiotics

- Routine treatment of uncomplicated acute bronchitis with antibiotics is not recommended, regardless of cough duration.
- Antibiotics are not needed for otherwise healthy adults with acute bronchitis.
- Efficacy of antibiotics for symptom relief from bronchitis is limited, including bronchitis due to atypical bacteria.

Acute Bronchitis Treatment Guideline

- Cough due to pertussis should be treated with antibiotic therapy (see other side for dosing).
- Offer assured follow up for symptoms persist or worsen.

Strategies to Reduce Antibiotic Use for Acute Bronchitis

- Use delayed prescription strategies, such as asking patients to call for or pick up an antibiotic or to hold an antibiotic prescription for a set amount of time.
- Address patient concerns in a compassionate manner.
- Discuss the expected course of illness and cough duration (two to three weeks).
- Explain that antibiotics do not significantly shorten illness duration and are associated with adverse effects and antibiotic resistance.
- Discuss the treatment plan, including the use of nonantibiotic medications to control symptoms.
- Describe the infection as a viral illness or chest cold.

NOTE: This guideline is not meant to replace the clinical judgment of the individual provider or establish a standard of care.

References

1. Agency for Healthcare Research and Quality. (2018). Infectious Diseases Society of America/ American Thoracic Society Consensus Guidelines on management of Community-Acquired Pneumonia in Adults. Retrieved from http://cds.ahrq.gov/cdsconnect/source/infectious-diseases-society-americaamerican-thoracic-society-consensus-guidelines
2. Agency for Healthcare Research and Quality. (2016). Interventions to improve antibiotic prescribing for uncomplicated acute respiratory tract infections. Retrieved from http://effectivehealthcare.ahrq.gov/topics/antibiotics-respiratory-infection/clinician
3. California Department of Public Health. (2018). Pertussis (Whooping Cough). Retrieved from http://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx
4. Centers for Disease Control and Prevention. (2017). Adult Treatment Recommendations. Retrieved from http://www.cdc.gov/antibiotic-use/community/for-hcp/outpatient-hcp/adult-treatment-rec.html
5. Centers for Disease Control and Prevention. (2018). Antibiotic prescribing and use in doctor's offices. Retrieved from http://www.cdc.gov/antibiotic-use/community/materials-references/print-materials/hcp/index.html
6. Harris, A., Hicks, L., & Qaseem, A. (2016). Appropriate antibiotic use for acute respiratory tract infection in adults: Advice for high-value care from the American College of Physicians and the Centers for Disease Control and Prevention. Annals Of Internal Medicine, 164(6), 425-434. doi:10.7326/M15-1840
7. HEDIS Measure. (2018). Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis. Retrieved from http://www.floridablue.com/sites/floridablue.com/files/docs/HEDIS%20Measure%20Acute%20Bronchitis%20900-0246B-0218Approved.pdf
8. Kinkade, S., & Long, N. (2016). Acute Bronchitis. American Family Physician, 94(7), 560-565

Appendix I

Memorandum

QUALITY IMPROVEMENT

TO: Medical Doctors, Physician Assistants, and Nurse Practitioners

RE: Acute Bronchitis Treatment Guideline (ABTG)

DATE: March 20 – 26, 2019

Antibiotic prescriptions in the outpatient health care settings, including primary care offices, urgent cares, and emergency rooms remain to be high and reports indicate that antibiotic prescriptions are unnecessary. To address these issues, the Acute Bronchitis Treatment Guideline (ABTG) was developed and will be implemented in this organization that will aid in reducing inappropriate antibiotic prescribing for acute bronchitis in adults. The goal of this guideline is to use antibiotic only when truly needed and using the right antibiotic for infection. This quality improvement program includes policies, and procedures, and tools that aims to guide medical staff in this organization toward more responsible and effective use of antibiotics. To achieve our goal for improvement, an educational session, and presentation of ABTG will undertake for three days *(March 22, 25, and 26, 2019).* This effort will be implemented beginning March 26, 2019. This is crucial to improving our patient outcomes. Your participation is required.

Appendix J

Educational Resource Materials for the Education Session

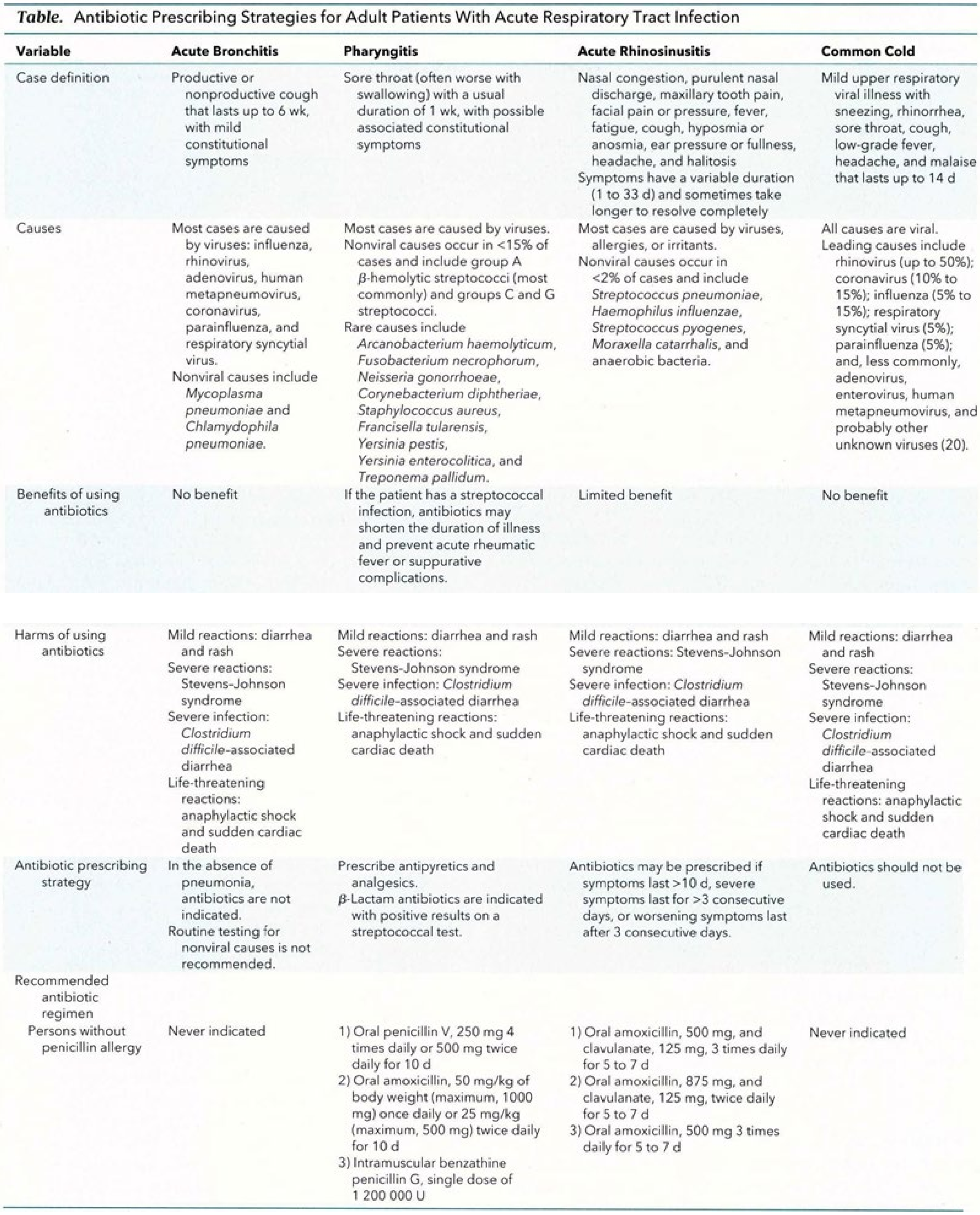


Table. Antibiotic Prescribing Strategies for Adult Patients With Acute Respiratory Tract Infection

Variable	**Acute Bronchitis**	**Pharyngitis**	**Acute Rhinosinusitis**	**Common Cold**
Case definition	Productive or nonproductive cough that lasts up to 6 wk, with mild constitutional symptoms	Sore throat (often worse with swallowing) with a usual duration of 1 wk, with possible associated constitutional symptoms	Nasal congestion, purulent nasal discharge, maxillary tooth pain, facial pain or pressure, fever, fatigue, cough, hyposmia or anosmia, ear pressure or fullness, headache, and halitosis Symptoms have a variable duration (1 to 33 d) and sometimes take longer to resolve completely	Mild upper respiratory viral illness with sneezing, rhinorrhea, sore throat, cough, low-grade fever, headache, and malaise that lasts up to 14 d
Causes	Most cases are caused by viruses: influenza, rhinovirus, adenovirus, human metapneumovirus, coronavirus, parainfluenza, and respiratory syncytial virus. Nonviral causes include *Mycoplasma pneumoniae* and *Chlamydophila pneumoniae*.	Most cases are caused by viruses. Nonviral causes occur in <15% of cases and include group A *β*-hemolytic streptococci (most commonly) and groups C and G streptococci. Rare causes include *Arcanobacterium haemolyticum*, *Fusobacterium necrophorum*, *Neisseria gonorrhoeae*, *Corynebacterium diphtheriae*, *Staphylococcus aureus*, *Francisella tularensis*, *Yersinia pestis*, *Yersinia enterocolitica*, and *Treponema pallidum*.	Most cases are caused by viruses, allergies, or irritants. Nonviral causes occur in <2% of cases and include *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Streptococcus pyogenes*, *Moraxella catarrhalis*, and anaerobic bacteria.	All causes are viral. Leading causes include rhinovirus (up to 50%); coronavirus (10% to 15%); influenza (5% to 15%); respiratory syncytial virus (5%); parainfluenza (5%); and, less commonly, adenovirus, enterovirus, human metapneumovirus, and probably other unknown viruses (20).
Benefits of using antibiotics	No benefit	If the patient has a streptococcal infection, antibiotics may shorten the duration of illness and prevent acute rheumatic fever or suppurative complications.	Limited benefit	No benefit
Harms of using antibiotics	Mild reactions: diarrhea and rash Severe reactions: Stevens-Johnson syndrome Severe infection: *Clostridium difficile*-associated diarrhea Life-threatening reactions: anaphylactic shock and sudden cardiac death	Mild reactions: diarrhea and rash Severe reactions: Stevens-Johnson syndrome Severe infection: *Clostridium difficile*-associated diarrhea Life-threatening reactions: anaphylactic shock and sudden cardiac death	Mild reactions: diarrhea and rash Severe reactions: Stevens-Johnson syndrome Severe infection: *Clostridium difficile*-associated diarrhea Life-threatening reactions: anaphylactic shock and sudden cardiac death	Mild reactions: diarrhea and rash Severe reactions: Stevens-Johnson syndrome Severe infection: *Clostridium difficile*-associated diarrhea Life-threatening reactions: anaphylactic shock and sudden cardiac death
Antibiotic prescribing strategy	In the absence of pneumonia, antibiotics are not indicated. Routine testing for nonviral causes is not recommended.	Prescribe antipyretics and analgesics. *β*-Lactam antibiotics are indicated with positive results on a streptococcal test.	Antibiotics may be prescribed if symptoms last >10 d, severe symptoms last for >3 consecutive days, or worsening symptoms last after 3 consecutive days.	Antibiotics should not be used.
Recommended antibiotic regimen				
Persons without penicillin allergy	Never indicated	1) Oral penicillin V, 250 mg 4 times daily or 500 mg twice daily for 10 d 2) Oral amoxicillin, 50 mg/kg of body weight (maximum, 1000 mg) once daily or 25 mg/kg (maximum, 500 mg) twice daily for 10 d 3) Intramuscular benzathine penicillin G, single dose of 1 200 000 U	1) Oral amoxicillin, 500 mg, and clavulanate, 125 mg, 3 times daily for 5 to 7 d 2) Oral amoxicillin, 875 mg, and clavulanate, 125 mg, twice daily for 5 to 7 d 3) Oral amoxicillin, 500 mg 3 times daily for 5 to 7 d	Never indicated

ACP[SM]
American College of Physicians
Leading Internal Medicine, Improving Lives

SUMMARY OF THE AMERICAN COLLEGE OF PHYSICIANS AND CENTERS FOR DISEASE CONTROL AND PREVENTION ADVICE FOR HIGH-VALUE CARE ON APPROPRIATE ANTIBIOTIC USE FOR ACUTE RESPIRATORY TRACT INFECTION IN ADULTS

Disease/Condition	Acute respiratory tract infection (ARTI)
Target Audience	Primary care providers, emergency medicine providers
Target Patient Population	Healthy adults
Intervention	Reduction in antibiotic prescriptions
Evidence That Using Antibiotics in Patients With ARTI Does Not Improve Outcomes	Multiple randomized clinical trials have shown that antibiotics are ineffective for most ARTIs. There is no benefit for patients with the common cold or acute uncomplicated bronchitis and limited benefit for patients diagnosed with bacterial rhinosinusitis.
Harms of Using Antibiotics	Annual direct costs are $6.5 billion and annual indirect costs are >$30 billion in the United States. Antibiotics are responsible for 1 of every 5 emergency department visits for drug-related complications. Complications occur in 5% to 25% of patients who use antibiotics. Antibiotic-associated diarrhea caused by *Clostridium difficile* is the most common serious complication, responsible for 29 300 deaths in the United States per year.
Approaches to Overcome Barriers to Evidence-Based Practice	Multidimensional approaches involving active clinician education work best to reduce antibiotic prescriptions, including physician and patient education, physician audit and feedback, delayed antibiotic prescriptions, health information technology, and financial or regulatory incentives.
Talking Points for Clinicians When Discussing the Use of Antibiotics in Patients With ARTI	The average adult has 2 to 3 episodes of ARTI per year. Symptoms usually resolve in 1 to 2 weeks, but cough can last up to 6 weeks. Symptomatic treatment tailored to patient preferences may provide relief. Antibiotics do not cure most ARTIs or reduce time to resolution of symptoms. Antibiotics cause many serious adverse effects and should be reserved for patients with confirmed group A streptococcal pharyngitis.
High-Value Care Advice	High-Value Care Advice 1: *Clinicians should not perform testing or initiate antibiotic therapy in patients with bronchitis unless pneumonia is suspected.* High-Value Care Advice 2: *Clinicians should test patients with symptoms suggestive of group A streptococcal pharyngitis (for example, persistent fevers, anterior cervical adenitis, and tonsillopharyngeal exudates or other appropriate combination of symptoms) by rapid antigen detection test and/or culture for group A* Streptococcus. *Clinicians should treat patients with antibiotics only if they have confirmed streptococcal pharyngitis.* High-Value Care Advice 3: *Clinicians should reserve antibiotic treatment for acute rhinosinusitis for patients with persistent symptoms for more than 10 days, onset of severe symptoms or signs of high fever (>39 °C) and purulent nasal discharge or facial pain lasting for at least 3 consecutive days, or onset of worsening symptoms following a typical viral illness that lasted 5 days that was initially improving (double sickening).* High-Value Care Advice 4: *Clinicians should not prescribe antibiotics for patients with the common cold.*

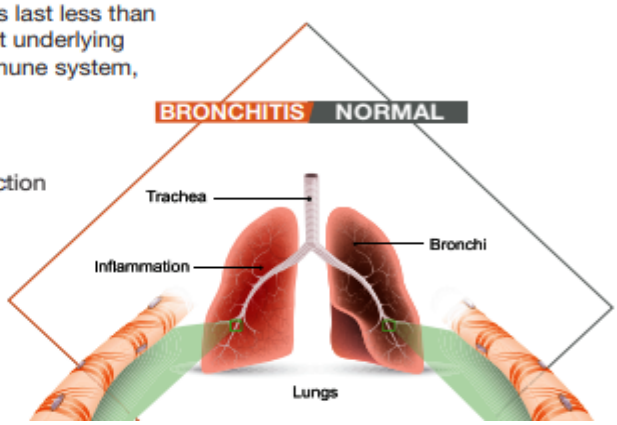

AN ANTIBIOTIC IS THE WRONG TOOL TO TREAT A VIRUS.
Make sure you use the right tool for the job.
Antibiotics save lives by treating certain infections caused by bacteria, not viruses like colds or flu. When they're not needed, antibiotics won't help you, and the side effects could still hurt you. Ask your doctor when an antibiotic is the right tool for your illness and when it's not.
To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.
BE ANTIBIOTICS AWARE
SMART USE, BEST CARE
CDC

Preventing and Treating Bronchitis

Cough keeping you up at night? Soreness in your chest and feeling fatigued? You could have acute bronchitis, but be aware: **an antibiotic will not help you get better.**

What is Acute Bronchitis?

Bronchitis occurs when the airways of the lungs swell and produce mucus. That's what makes you cough. Acute bronchitis, often called a "chest cold," is the most common type of bronchitis. The symptoms last less than 3 weeks. If you're a healthy person without underlying heart or lung problems or a weakened immune system, this information is for you.



Symptoms of Acute Bronchitis:

- Coughing with or without mucus production

You may also experience:

- Soreness in the chest
- Fatigue (feeling tired)
- Mild headache
- Mild body aches
- Watery eyes
- Sore throat

Causes

- Acute bronchitis is usually caused by a virus and often occurs after an upper respiratory infection.
- Bacteria can sometimes cause acute bronchitis, but even in these cases antibiotics are NOT recommended and will not help you get better.

When to Seek Medical Care

See a healthcare professional if you or your child have any of the following:

- Temperature higher than 100.4 °F
- Cough with bloody mucus
- Shortness of breath or trouble breathing
- Symptoms that last more than 3 weeks
- Repeated episodes of bronchitis

Centers for Disease Control and Prevention
National Center for Emerging and Zoonotic Infectious Diseases

CS275374A

Recommended Treatment

Good news! Acute bronchitis almost always gets better on its own—without antibiotics. Using antibiotics when they aren't needed can do more harm than good. Unintended consequences of antibiotics include side effects, like rash and diarrhea, as well as more serious consequences, such as an increased risk for an antibiotic-resistant infection or *Clostridium difficile* infection, a sometimes deadly diarrhea.

To Feel Better:

- Get plenty of rest
- Drink plenty of fluids
- Use a clean humidifier or cool mist vaporizer
- Breathe in steam from a bowl of hot water or shower
- Use lozenges *(do not give lozenges to children younger than 4 years of age)*
- Ask your healthcare professional or pharmacist about over-the-counter medicines that can help you feel better

Remember, always use over-the-counter medicines as directed. **Do not use cough and cold medicines in children younger than 4 years of age** unless specifically told to do so by a healthcare professional.

Your healthcare professional will most likely prescribe antibiotics for a diagnosis of whooping cough (pertussis) or pneumonia.

Prevention

- Practice good hand hygiene
- Make sure you and your child are to up-to-date with all recommended vaccines
- Don't smoke and avoid secondhand smoke, chemicals, dust, or air pollution
- Always cover your mouth and nose when coughing or sneezing
- Keep your distance from others when you are sick, if possible

And Remember:

Antibiotics will not treat acute bronchitis. Using antibiotics when not needed could do more harm than good.

Adult Treatment Recommendations for Appropriate Antibiotic Prescribing

Condition	Epidemiology	Diagnosis	Management

Acute rhinosinusitis[1,2]	• About 1 out of 8 adults (12%) in 2012 reported receiving a diagnosis of rhinosinusitis in the previous 12 months, resulting in more than 30 million diagnoses
	• Ninety–98% of rhinosinusitis cases are viral, and antibiotics are not guaranteed to help even if the causative agent is bacterial.
		• Diagnose acute bacterial rhinosinusitis based on symptoms that are:
		  ◦ **Severe (>3-4 days),** such as a fever ≥39°C (102°F) and purulent nasal discharge or facial pain;
		  ◦ **Persistent (>10 days) without improvement**, such as nasal discharge or daytime cough; or
		  ◦ **Worsening (3-4 days)** such as worsening or new onset fever, daytime cough, or nasal discharge after initial improvement of a viral upper respiratory infections (URI) lasting 5-6 days.
		• Sinus radiographs are not routinely recommended.
			If a bacterial infection is established:
			• Watchful waiting is encouraged for uncomplicated cases for which reliable follow-up is available.
			• Amoxicillin or amoxicillin/clavulanate is the recommended first-line therapy.
			• Macrolides such as azithromycin are not recommended due to high levels of *Streptococcus pneumoniae* antibiotic resistance (~40%).
			• For penicillin-allergic patients, doxycycline or a respiratory fluoroquinolone (levofloxacin or moxifloxacin) are recommended as alternative agents.

Acute uncomplicated bronchitis[3-5]	• Cough is the most common symptom for which adult patients visit their primary care provider, and acute bronchitis is the most common diagnosis in these patients.	• Evaluation should focus on ruling out pneumonia, which is rare among otherwise healthy adults in the absence of abnormal vital signs (heart rate ≥ 100 beats/min, respiratory rate ≥ 24 breaths/min, or oral temperature≥ 38 °C) and abnormal lung examination findings (focal consolidation, egophony, fremitus). • Colored sputum does not indicate bacterial infection. • For most cases, chest radiography is not indicated.	Routine treatment of uncomplicated acute bronchitis with antibiotics is not recommended, regardless of cough duration. Options for symptomatic therapy include: • Cough suppressants (codeine, dextromethorphan); • First-generation antihistamines (diphenhydramine); • Decongestants (phenylephrine). Evidence supporting specific symptomatic therapies is limited.

Delayed Prescribing Prescription Pads

What Is Delayed Prescribing?

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

WAIT. DO NOT FILL YOUR PRESCRIPTION JUST YET.

Your healthcare professional believes your illness may resolve on its own.

First, follow your healthcare professional's recommendations to help you feel better without antibiotics. Continue to monitor your own symptoms over the next few days.

- ◯ Rest.
- ◯ Drink extra water and fluids.
- ◯ Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- ◯ For sore throats in adults and older children, try ice chips, sore throat spray, or lozenges.
- ◯ Use honey to relieve cough. Do not give honey to an infant younger than 1.

If you **do not feel better in ____ days/hours or feel worse,** go ahead and fill your prescription.

If you **feel better, you do not need the antibiotic,** and do not have to risk the side effects.

Waiting to see if you really need an antibiotic can help you take antibiotics only when needed. When antibiotics aren't needed, they won't help you, and the side effects could still hurt you. Common side effects of antibiotics can include rash, dizziness, nausea, diarrhea, and yeast infections.

Antibiotics save lives, and when a patient needs antibiotics, the benefits outweigh the risks of side effects. You can protect yourself and others by learning when antibiotics are and are not needed.

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use.**

CDC

Symptom Relief for Viral Illnesses

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

1. DIAGNOSIS

- ☐ Cold or cough
- ☐ Middle ear fluid (Otitis Media with Effusion, OME)
- ☐ Flu
- ☐ Viral sore throat
- ☐ Bronchitis
- ☐ Other:

You have been diagnosed with an illness caused by a virus. Antibiotics do not work on viruses. When antibiotics aren't needed, they won't help you, and the side effects could still hurt you. The treatments prescribed below will help you feel better while your body fights off the virus.

2. GENERAL INSTRUCTIONS

- ☐ Drink extra water and fluids.
- ☐ Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- ☐ For sore throats in older children and adults, use ice chips, sore throat spray, or lozenges.
- ☐ Use honey to relieve cough. Do not give honey to an infant younger than 1.

3. SPECIFIC MEDICINES

- ☐ Fever or aches:
- ○ Ear pain:
- ○ Sore throat and congestion:

Use medicines according to the package instructions or as directed by your healthcare professional. Stop the medication when the symptoms get better.

4. FOLLOW UP

- ☐ If not improved in ____ days/hours, if new symptoms occur, or if you have other concerns, please call or return to the office for a recheck.
- ○ Phone:
- ○ Other:

Signed: _____

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use.**

What Is Watchful Waiting?

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

WAIT. DO NOT FILL YOUR PRESCRIPTION JUST YET.

Your healthcare professional believes your illness may go away on its own.

You should watch and wait for _____ **days/hours** before deciding whether to take an antibiotic.

In the meantime, follow your healthcare professional's recommendations to help you feel better and continue to **monitor your own symptoms** over the next few days.

- ○ Rest.
- ○ Drink extra water and fluids.
- ○ Use a cool mist vaporizer or saline nasal spray to relieve congestion.
- ○ For sore throats in adults and older children, try ice chips, sore throat spray, or lozenges.
- ○ Use honey to relieve cough. Do not give honey to an infant younger than 1.

If you **feel better, no further action is necessary. You don't need antibiotics.**

If you **do not** feel better, experience **new symptoms,** or have **other concerns**, call your healthcare professional _____. **Discuss whether you need a recheck or antibiotics.**

It may not be convenient to visit your healthcare professional multiple times, but it is critical to take antibiotics only when needed. When antibiotics aren't needed, they won't help you and the side effects could still hurt you. Common side effects of antibiotics can include rash, dizziness, nausea, diarrhea, and yeast infections.

Antibiotics save lives, and when a patient needs antibiotics, the benefits outweigh the risks of side effects. You can protect yourself and others by learning when antibiotics are and are not needed.

To learn more about antibiotic prescribing and use, visit **www.cdc.gov/antibiotic-use.**

CDC

Patient Education Resources

Print, distribute, and display these resources in your offices and waiting rooms.

Appendix K

Summary of Paired T-test (pre- and post- education session)

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Ed_PreTestSCORE	89.7433	6	9.31526	3.80294
	Ed_PostTestSCORE	100.0000	6	.00000	.00000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Ed_PreTestSCORE - Ed_PostTestSCORE	-10.25667	9.31526	3.80294	-20.03243	-.48091	-2.697	5	.043

Pre_Post_ABTG * Prescribed_Antibiotic Crosstabulation

			Prescribed_Antibiotic Not Prescribed	Prescribed Antibiotic	Total
Pre_Post_ABTG	Before Training	Count	23	17	40
		Expected Count	24.8	15.2	40.0
		% within Pre_Post_ABTG	57.5%	42.5%	100.0%
		% within Prescribed_Antibiotic	56.1%	68.0%	60.6%
	After Training	Count	18	8	26
		Expected Count	16.2	9.8	26.0
		% within Pre_Post_ABTG	69.2%	30.8%	100.0%
		% within Prescribed_Antibiotic	43.9%	32.0%	39.4%
Total		Count	41	25	66
		Expected Count	41.0	25.0	66.0
		% within Pre_Post_ABTG	62.1%	37.9%	100.0%
		% within Prescribed_Antibiotic	100.0%	100.0%	100.0%

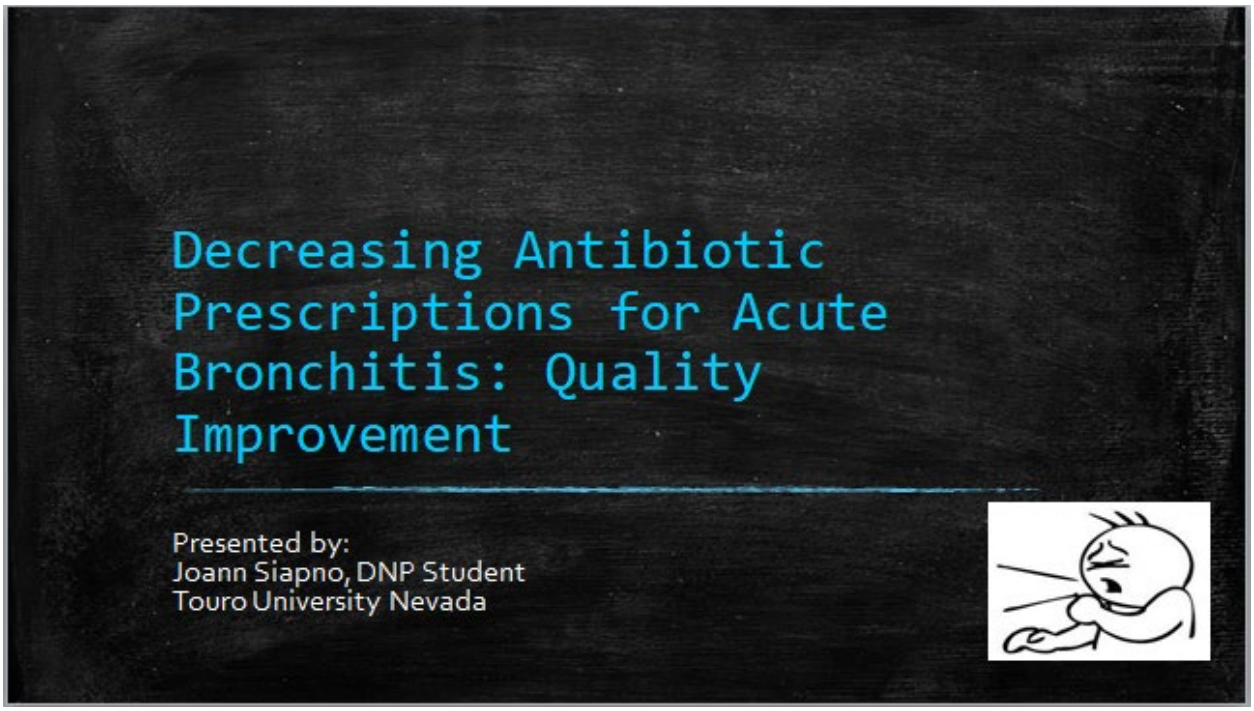
Appendix L

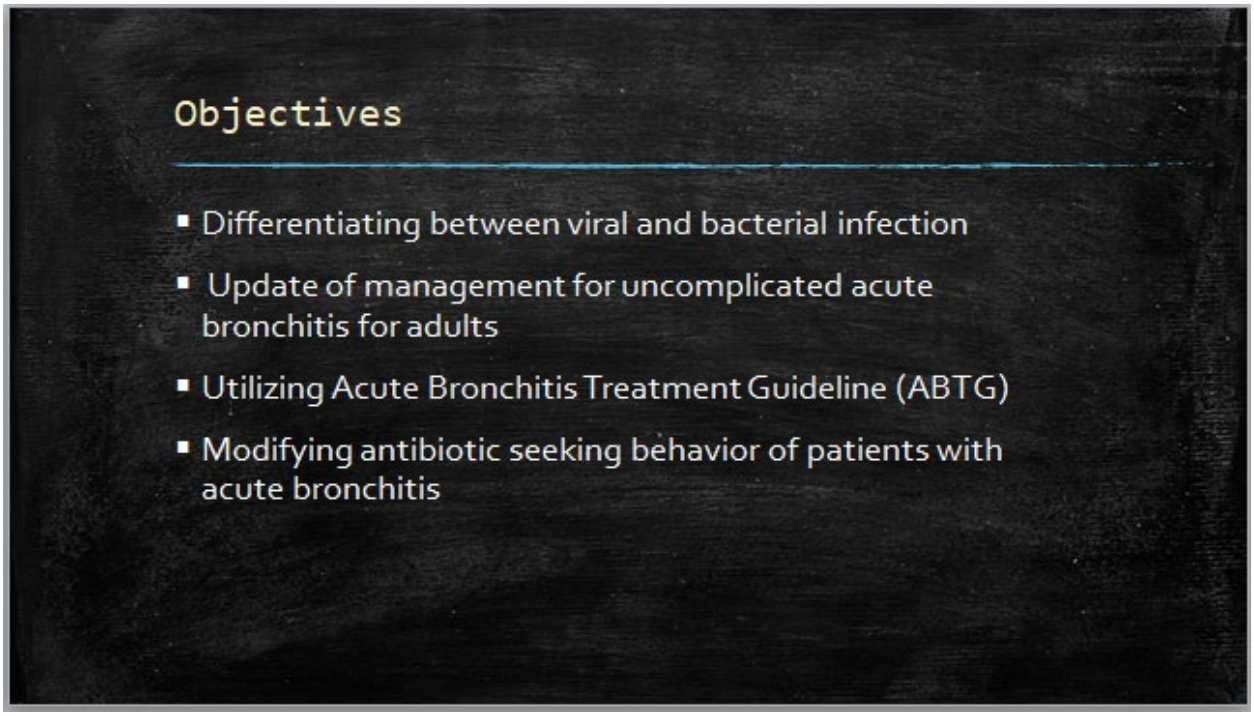
Individual Knowledge Test Scores

Participant	Pre-test Score Mean %	Post-test Score Mean %
Provider 1	100%	100%
Provider 2	76.92%	100%
Provider 3	84.62%	100%
Provider 4	92.30%	100%
Provider 5	84.62%	100%
Provider 6	100%	100%

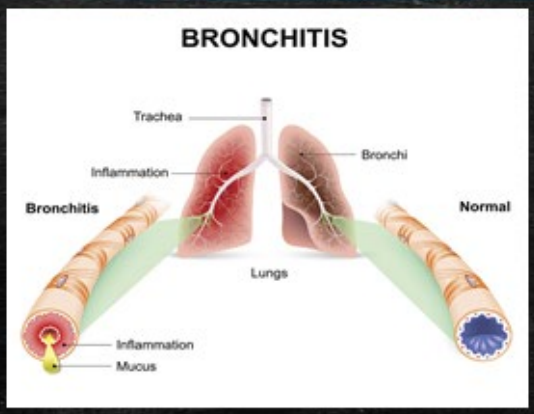
Appendix M

Provider Training PowerPoint





Introduction

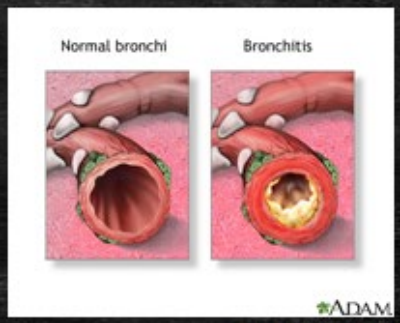


Acute Bronchitis occurs when the airways of the lungs swell and produce mucus causing cough.

(CDC, 2017)

What is Acute Bronchitis?

- Airways of the lungs swell and produce mucus.
- "Chest cold," - common type of bronchitis. Lasting less than 3 weeks.
- Cough – most common symptom for adult patient visit in urgent care
- Acute Uncomplicated Bronchitis – most common diagnosis for adult patients representing with cough



(Penn Medicine., 2018)

Symptoms & Diagnosis

Colored Sputum
- Does not indicate bacterial infection

Cough for 1-3 weeks
- May linger up to 6-8 weeks

May have wheezing and rhonchi on chest exam
- NOT rales or signs of consolidation

Low grade fever
- Common early in the illness

Chest radiography
- Not indicated in most cases

"Chest Cold"
- Reduces expectation for antibiotics

(Harris, Hicks, & Qaseem, 2016)

> heart rate ≥ 100 beats/min

> respiratory rate ≥ 24 breaths/min

> oral temperature≥ 38 °C

> abnormal lung examination findings (focal consolidation, egophony, fremitus)

Ruling out other diagnoses
PNEUMONIA and PERTUSSIS

(CDC, 2017)

Ruling out other causes

Consider Pertussis

- Inspiratory whoop
- Paroxysms
- Exposure to known pertussis case
- Pertussis is circulating widely in the community

Ruling out Pneumonia

- Oxygen saturation
- Unlikely in healthy immunocompetent adults <70
- HR > 100bpm
- RR > 24 bpm
- Oral temp >38C
- Rales, eghophony, tactile fremitus, dullness to percussion
- Infiltrate on chest x-ray

When to consider for Chest X-Ray?

Signs/symptoms or suspicion of pneumonia:

- Cough not improving after > 6-8 weeks
- Abnormal oxygen saturation, vital signs, or chest exam
- Fever > 4 days, or recurrent fever after having resolved for > 24 hours, Oral body temperature > 100°F (37.8°C)
- Dyspnea, bloody sputum, or rusty sputum color
- Pulse > 100 beats per minute
- Respiratory rate > 24 breaths per minute
- Focal consolidation, egophony, or fremitus on chest examination
- History of smoking

NOTE:

Treat pneumonia with antibiotics

Treatment for Acute Uncomplicated Bronchitis (Adults)

NOTE: Not intended for patients with chronic bronchitis, COPD, or other serious comorbidities

- Cough suppressants (codeine, dextromethorphan);
- First-generation antihistamines (diphenhydramine);
- Decongestants (phenylephrine).
- Extra rest, hot drinks, oral hydration.
- Analgesics/antipyretics, as needed.
- Consider bronchodilators if history of asthma.
- Inhale steam from shower or bath to loosen secretions.
- Avoid cigarette smoke; offer smoking cessation resources, if indicated.

BE ANTIBIOTICS AWARE
SMART USE, BEST CARE

(CDC, 2018)

Avoid Antibiotics

- Routine antibiotics is not recommended, regardless of cough duration.
- Not needed for otherwise healthy adults with acute bronchitis.
- Efficacy of antibiotics for symptom relief from bronchitis is limited, including bronchitis due to atypical bacteria.
- Cough due to pertussis should be treated with antibiotic therapy
- Offer assurance follow up for symptoms persist or worsen.

Be Antibiotics Aware

(WHO & CDC, 2018)

Antibiotic Resistance

- Antibiotic resistance - 2 million infections and 23,000 deaths per year in the United States (CDC, 2016)
- Pathogens resistant to first-line antibiotics requires treatment with alternative antibiotics that can be expensive and toxic (CDC, 2016).
- Increased health care costs and, increased morbidity and mortality.
- Modifiable risk factor – inappropriate antibiotic prescribing.
- Half of outpatient antibiotic prescribing in humans might be inappropriate in addition to unnecessary antibiotic prescribing.
- At least 30% of outpatient antibiotic prescriptions in the United States are unnecessary.

Role of healthcare providers

- Accountability and Commitment
- Judicious use of antibiotics
- Policy Implementation
- Monitor antibiotic prescribing practices Offer regular feedback to clinicians.
- Education and expertise

MY ROLE MATTERS IN FIGHTING ANTIMICROBIAL RESISTANCE

(Biomerieux., 2019)

Strategies to Reduce Antibiotic Use for Acute Bronchitis

- Delayed prescription strategies
- Address patient concerns in a compassionate manner.
- Discuss the expected course of illness and cough duration.
- Explain and Discuss
- Describe the infection as a viral illness or chest cold.


Printed Materials for Healthcare professionals
What Is Delayed Prescribing?
BE ANTIBIOTICS AWARE
WAIT. DO NOT FILL YOUR PRESCRIPTION JUST YET.
Your healthcare professional believes your illness may resolve on its own.
First, follow your healthcare professional's recommendations to help you feel better without antibiotics. Continue to monitor your own symptoms over the next few days.
Rest.
Drink extra water and fluids.
Use a cool mist vaporizer or saline nasal spray to relieve congestion.
For sore throats in adults and older children, try ice chips, sore throat spray, or lozenges.
Use honey to relieve cough. Do not give honey to an infant younger than 1.
If you do not feel better in ____ days/hours or feel worse, go ahead and fill your prescription.
If you feel better, you do not need the antibiotic, and do not have to risk the side effects.
Waiting to see if you really need an antibiotic can help you take antibiotics only when needed. When antibiotics aren't needed, they won't help you, and the side effects could still hurt you. Common side effects of antibiotics can include rash, dizziness, nausea, diarrhea, and yeast infections.
Antibiotics save lives, and when a patient needs antibiotics, the benefits outweigh the risks of side effects. You can protect yourself and others by learning when antibiotics are and are not needed.
To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.
CDC
Symptom Relief for Viral Illnesses
BE ANTIBIOTICS AWARE
1. DIAGNOSIS
Cold or cough
Middle ear fluid (Otitis Media with Effusion, OME)
Flu
Viral sore throat
Bronchitis
Other:
2. GENERAL INSTRUCTIONS
Drink extra water and fluids.
Use a cool mist vaporizer or saline nasal spray to relieve congestion.
For sore throats in older children and adults, use ice chips, sore throat spray, or lozenges.
Use honey to relieve cough. Do not give honey to an infant younger than 1.
3. SPECIFIC MEDICINES
Fever or aches
Ear pain
Sore throat and congestion
4. FOLLOW UP
Phone
Other:
Signed
To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.
CDC
(CDC, 2017)


What Is Watchful Waiting?
BE ANTIBIOTICS AWARE
WAIT. DO NOT FILL YOUR PRESCRIPTION JUST YET.
Your healthcare professional believes your illness may go away on its own.
You should watch and wait for ____ days/hours before deciding whether to take an antibiotic.
In the meantime, follow your healthcare professional's recommendations to help you feel better and continue to monitor your own symptoms over the next few days.
Rest.
Drink extra water and fluids.
Use a cool mist vaporizer or saline nasal spray to relieve congestion.
For sore throats in adults and older children, try ice chips, sore throat spray, or lozenges.
Use honey to relieve cough. Do not give honey to an infant younger than 1.
If you feel better, no further action is necessary. You don't need antibiotics.
If you do not feel better, experience new symptoms, or have other concerns, call your healthcare professional _____. Discuss whether you need a recheck or antibiotics.
It may not be convenient to visit your healthcare professional multiple times, but it is critical to take antibiotics only when needed. When antibiotics aren't needed, they won't help you and the side effects could still hurt you. Common side effects of antibiotics can include rash, dizziness, nausea, diarrhea, and yeast infections.
Antibiotics save lives, and when a patient needs antibiotics, the benefits outweigh the risks of side effects. You can protect yourself and others by learning when antibiotics are and are not needed.
To learn more about antibiotic prescribing and use, visit www.cdc.gov/antibiotic-use.
CDC
(CDC, 2017)

Acute Bronchitis Treatment Guideline (ABTG)

Acute Bronchitis Treatment Guideline

Acute Uncomplicated Bronchitis (Adults)

This guideline is not intended for patients with chronic bronchitis, COPD, or other serious comorbidities.

Symptoms and Diagnosis

- Most common for adult patients visit is Cough. Acute bronchitis is the most common diagnosis in patients who represents with cough.
- Evaluation should focus on ruling out pneumonia, which is rare among otherwise healthy adults in the absence of abnormal vital signs (heart rate ≥ 100 beats/min, respiratory rate ≥ 24 breaths/min, or oral temperature ≥ 38 °C) and abnormal lung examination findings (focal consolidation, egophony, fremitus).
- Colored sputum does not indicate bacterial infection.
- For most cases, chest radiography is not indicated.
- Cough for 1-3 weeks (may linger up to 6-8 weeks).
- May have wheezing or rhonchi on chest exam, but NOT rales or signs of consolidation.
- Low grade fever (common early in the illness)
- Term "chest cold" rather than bronchitis may reduce expectation for antibiotics

Consider Pertussis

Treat and test for Pertussis with PERSISTENT COUGH when any of the following symptoms are present:

- Inspiratory whoop
- Paroxysms
- Exposure to known pertussis case
- Pertussis is circulating widely in the community

NOTE: See California pertussis update at:
https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx

Ruling out PNEUMONIA

Assess oxygen saturation in addition to vital signs.
Pneumonia is UNLIKELY in healthy immunocompetent adults < 70 years without:

- Heart rate > 100 bpm
- Respiratory rate > 24 bpm
- Oral temperature > 38°C (100.4°F)
- Abnormal chest exam (rales, egophony, tactile fremitus, or dullness to percussion)
- Infiltrate on chest x-ray

When to consider Chest X-Ray:

Signs/symptoms or suspicion of pneumonia:

- Cough not improving after > 6-8 weeks
- Abnormal oxygen saturation, vital signs, or chest exam
- Fever > 4 days, or recurrent fever after having resolved for > 24 hours, Oral body temperature > 100°F (37.8°C)
- Dyspnea, bloody sputum, or rusty sputum color
- Pulse > 100 beats per minute
- Respiratory rate > 24 breaths per minute
- Focal consolidation, egophony, or fremitus on chest examination
- History of smoking

NOTE: Treat pneumonia with antibiotics.

Treatment

Symptomatic Treatment

- Cough suppressants (codeine, dextromethorphan);
- First-generation antihistamines (diphenhydramine);
- Decongestants (phenylephrine).

(cont.) Acute Bronchitis Treatment Guideline

- Extra rest, hot drinks, oral hydration.
- Analgesics/antipyretics, as needed.
- Consider bronchodilators if history of asthma.
- Inhale steam from shower or bath to loosen secretions.
- Avoid cigarette smoke; offer smoking cessation resources, if indicated.

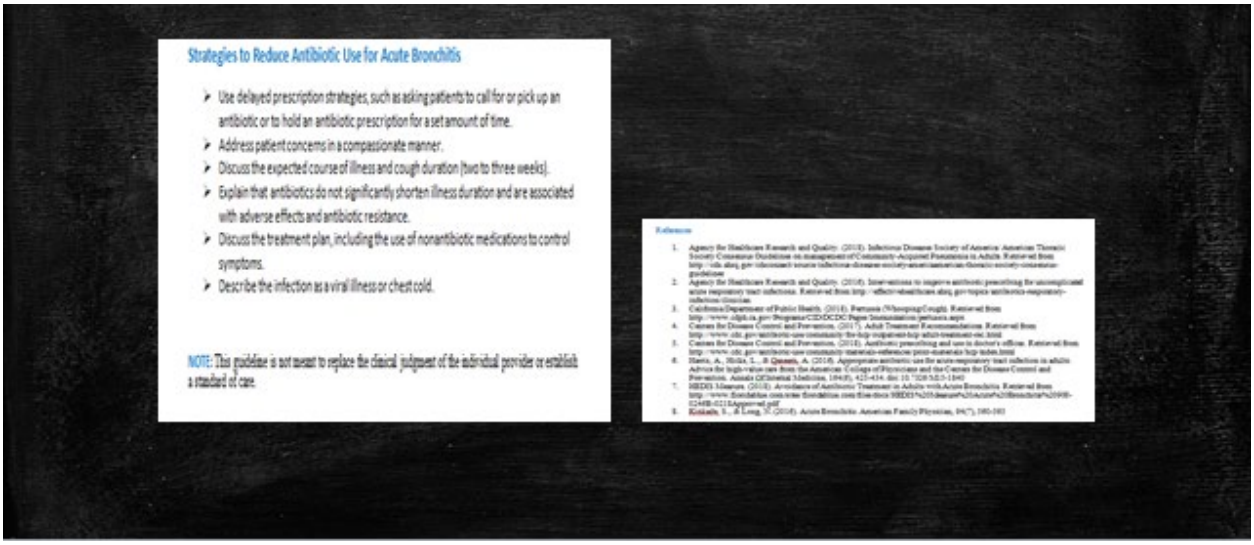
Offer positive recommendations using this Symptomatic Prescription Pad:
https://www.cdc.gov/antibiotic-use/community/materials-references/print-materials/hcp/index.html

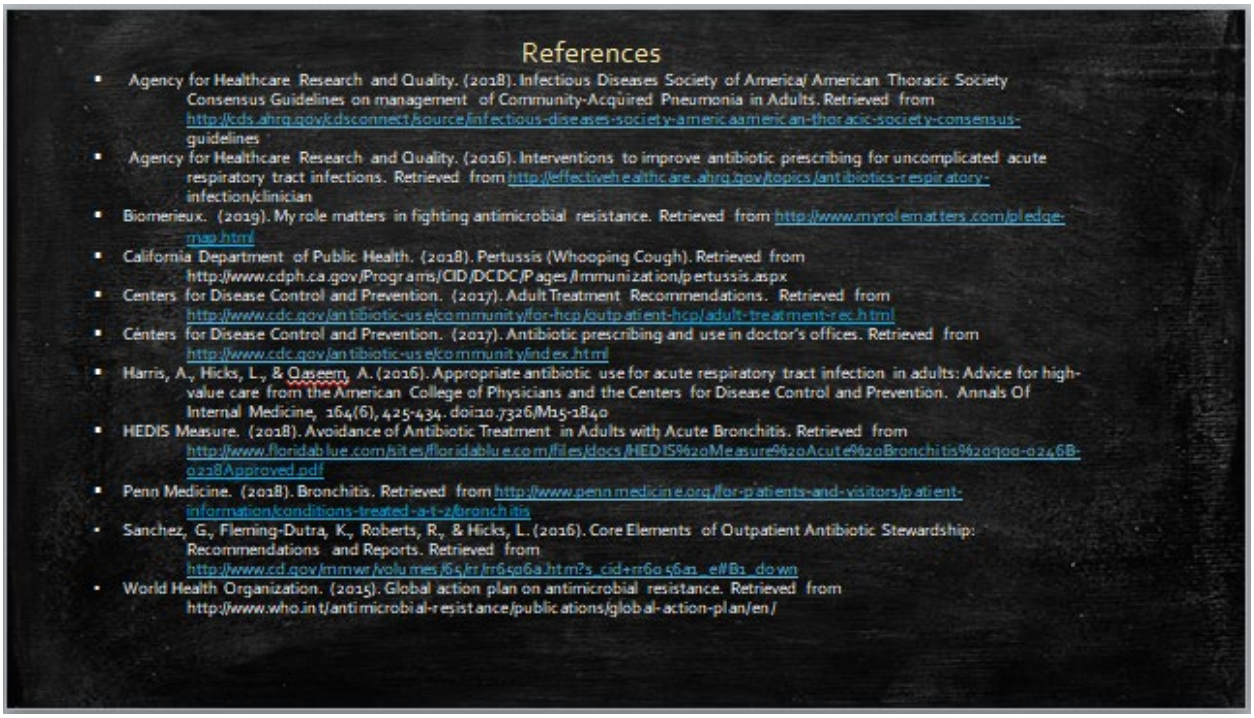
NOTE: Evidence supporting specific symptomatic therapies is limited.

Avoid Antibiotics

- Routine treatment of uncomplicated acute bronchitis with antibiotics is not recommended, regardless of cough duration.
- Antibiotics are not needed for otherwise healthy adults with acute bronchitis.
- Efficacy of antibiotics for symptom relief from bronchitis is limited, including bronchitis due to atypical bacteria.

- Cough due to pertussis should be treated with antibiotic therapy (see other side for dosing).
- Offer assured follow up for symptoms persist or worsen.





References

- Agency for Healthcare Research and Quality. (2018). Infectious Diseases Society of America/ American Thoracic Society Consensus Guidelines on management of Community-Acquired Pneumonia in Adults. Retrieved from http://cds.ahrq.gov/cdsconnect/source/infectious-diseases-society-americaamerican-thoracic-society-consensus-guidelines
- Agency for Healthcare Research and Quality. (2016). Interventions to improve antibiotic prescribing for uncomplicated acute respiratory tract infections. Retrieved from http://effectivehealthcare.ahrq.gov/topics/antibiotics-respiratory-infection/clinician
- Biomerieux. (2019). My role matters in fighting antimicrobial resistance. Retrieved from http://www.myrolematters.com/pledge-map.html
- California Department of Public Health. (2018). Pertussis (Whooping Cough). Retrieved from http://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/pertussis.aspx
- Centers for Disease Control and Prevention. (2017). Adult Treatment Recommendations. Retrieved from http://www.cdc.gov/antibiotic-use/community/for-hcp/outpatient-hcp/adult-treatment-rec.html
- Centers for Disease Control and Prevention. (2017). Antibiotic prescribing and use in doctor's offices. Retrieved from http://www.cdc.gov/antibiotic-use/community/index.html
- Harris, A., Hicks, L., & Qaseem, A. (2016). Appropriate antibiotic use for acute respiratory tract infection in adults: Advice for high-value care from the American College of Physicians and the Centers for Disease Control and Prevention. Annals Of Internal Medicine, 164(6), 425-434. doi:10.7326/M15-1840
- HEDIS Measure. (2018). Avoidance of Antibiotic Treatment in Adults with Acute Bronchitis. Retrieved from http://www.floridablue.com/sites/floridablue.com/files/docs/HEDIS%20Measure%20Acute%20Bronchitis%202020-0246B-0218Approved.pdf
- Penn Medicine. (2018). Bronchitis. Retrieved from http://www.pennmedicine.org/for-patients-and-visitors/patient-information/conditions-treated-a-t-z/bronchitis
- Sanchez, G., Fleming-Dutra, K., Roberts, R., & Hicks, L. (2016). Core Elements of Outpatient Antibiotic Stewardship: Recommendations and Reports. Retrieved from http://www.cdc.gov/mmwr/volumes/65/rr/rr6506a1.htm?s_cid=rr6506a1_e#B1_down
- World Health Organization. (2015). Global action plan on antimicrobial resistance. Retrieved from http://www.who.int/antimicrobial-resistance/publications/global-action-plan/en/